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Predicting Risk of Reoffending in Child Sexual Exploitation Material Offenders: The use of Child Pornography Offender Risk Tool in a Scottish population

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Lay Summary

The past decades have seen more people, especially children and adolescents, using the internet and social media as their first resource to look for information, entertainment and to interact with others. Unfortunately, this puts young people at a greater risk of becoming a victim of online sexual abuse. Internet sexual offences can include downloading, viewing, creating and uploading indecent photos/videos involving child sexual abuse online. Despite an increased awareness of the problem, the recent years have seen more people being convicted of those offences. Although government and law enforcement have statistics on the number of convictions, it is impossible to know the true number of individuals who admit having a sexual interest in children. Many studies suggested that it is more common in the general public than one might expect.

Most studies which looked at the risk of reoffending of internet sexual offenders found that they usually have a lower risk of committing another offence than other sexual offenders who have committed offline (i.e. contact) offences. While the risk seems low, the risk is still there, and professionals working with those offenders need to have a good understanding of that risk to be able to supervise and manage them when in the community. It is then important for researchers to look for the factors that might predict the risk of reoffending in internet sexual offenders. One study looked at this topic and found seven main risk factors related to reoffending in internet sexual offenders. Based on these seven risk factors, they created a risk assessment tool called the Child Pornography Offender Risk Tool (CPORT) which has been tested in a Canadian sample of internet sexual offenders. To see if it can be used on a larger scale, it is important to test it in non-Canadian populations.

The present thesis first searched the literature for studies looking at the number of individuals who reported having a sexual interest in children. This search resulted in 27 studies. These helped in giving a better understanding of the number of people, from the

general public and other places (e.g. clinics, prisons), who have this sexual interest. It also highlighted factors related to those people such as their gender, age and life experiences (e.g. history of trauma, mental health). Then, a second study was completed in order to test the validity of the CPORT in a large sample of Scottish internet sexual offenders. The researcher used information given by Police Scotland on 144 internet sexual offenders. From this information, the researcher looked at their offences and if they have reoffended and tested the seven items of the CPORT. The results from this study showed that the CPORT could predict the risk of reoffending in this sample and could then be used in a Scottish population of internet sexual offenders. This could help Police Scotland and other agencies working with internet sexual offenders to assess their level of risk and prioritise their resources when managing and supervising them in the community. It will also encourage other researchers from other countries to look at its validity within their population.

Thesis Abstract

Background: The past decade has seen an increase in the use of communication technology such as smartphones and social media platforms. Although this improvement in technology might support enhancing communication, socialisation and even education, it also increases the risk of child sexual exploitation. Not only do more children now have access to technology to share personal information which could then be exploited, but more individuals have access to that technology to download, produce and share children sexual exploitation material (CSEM). It is impossible to have an accurate understanding of the prevalence of individuals having sexual interest in children (SIIC) and accessing CSEM who have not been caught. Research suggests that SIIC is commonly seen in the general population and does not solely prevail in sex offender populations. There has been an increase in the past decade in CSEM offences and convictions and organisations have been implemented to support individuals who self-report SIIC. Although research shows that these individuals who committed CSEM offences generally are at low risk of reoffending, certain factors do increase that risk. Law enforcement and criminal justice professionals are required to evaluate their level of risk to inform management, supervision and treatment in the community. The Child Pornography Offender Risk Tool (CPORT) was created specifically for this offender population and has been found to show significant predictive validity for any recidivism and any sexual recidivism; but has not been validated yet in a Scottish population.

Method: Firstly, a systematic review of the literature was conducted to investigate the prevalence of individuals who self-report SIIC and their correlates to obtain a better understanding of the phenomenon. Secondly, the empirical research study aimed to replicate the most recent CPORT validation study to investigate the CPORT's predictive validity in a sample of 144 Scottish CSEM offenders. Like the CPORT validation study, Receiver Operating Characteristic (ROC) and logistic regression analyses were conducted to explore

its predictive validity. In addition, the CPORT's Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) were added to the investigation of its predictive validity in this study.

Results: A total of 27 studies were analysed in the systematic review and results indicated a mean prevalence rate of SIIC between 16%-21%. Findings also suggested correlates of SIIC such as the presence of mental health problems and adverse childhood experiences. In the empirical research study, ROC and logistic regression analyses indicated that the CPORT significantly predicted any recidivism (Area Under the Curve, AUC = .79), any sexual recidivism (AUC = .79) and CSEM recidivism (AUC = .75), suggesting that it is a valid risk assessment tool for Scottish CSEM offenders. These results were also supported by the other indicators of predictive validity assessed in this study.

Conclusions: Overall, the findings from the systematic review suggest that self-reported SIIC in the general population is relatively common and some studies have indicated that individuals from the general public have already accessed CSEM or would do so if they were certain to avoid detection. However, prevalence rates did vary greatly from one study to another, depending on the definition of SIIC and recruitment method used. Generally, the findings indicated inconsistencies in terms of methodology and definition/diagnostic criteria of SIIC and poor external validity. The sensitive nature of this topic likely increases the difficulties that researchers encounter in recruiting representative samples as well as relying on participants' self-reported answers. The empirical study indicated that the CPORT is a valid risk assessment tool to be used in a Scottish population of CSEM offenders. The implications of this research suggest that the CPORT could be used with a combination of other tools assessing dynamic and protective factors to inform relevant authorities and support them in the supervision and management of individuals with CSEM offences.

Strengths and limitations of the systematic review and the research were discussed with implications for clinical practice and recommendations for future research.

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Chapter One

Prevalence and Correlates of Individuals with Sexual Interest in Children:

A Systematic Review*

Word count: 10,981 (excluding tables, figures and reference list)

* This paper has been prepared according to the requirements of the Journal of Child Abuse and Neglect.

Abstract

Despite debates on what should constitute sexual interest in children in terms of definition and diagnostic criteria and its strong association with individuals who commit sexual offences against children, research in this area has shown that sexual interest in children is also commonly seen in the general population. Studies in this field have investigated its prevalence and its correlates. However, most research on this topic has focused on men and most particularly sex offender populations. When investigating the general population, again the vast majority of studies used male samples and students. This systematic review aimed to critically evaluate previous research on the prevalence of sexual interest in children across populations and to examine its correlates. A search of relevant databases was conducted as well as a hand search of selected journals to identify eligible papers. Studies meeting the inclusion criteria had their data extracted and were assessed for risk of bias, with a second rater to establish inter-rater reliability. A total of 27 studies were reviewed and results indicated a mean prevalence rate of sexual interest in children between 16%-21%. Findings also indicated correlates such as the presence of mental health problems and adverse childhood experiences. Most studies showed poor external validity, with the majority of them scoring high on risk of bias. Overall, the findings indicate inconsistencies in terms of methodology and definition/diagnostic criteria of sexual interest in children. Further research in this area using recommended methodology to avoid biases is recommended.

Keywords: Sexual interest in children, paedophilia, sexual fantasies, child sexual abuse

Introduction

Exploring people's sexuality in terms of fantasies, behaviours and interest/preference has been the subject of researchers' curiosity for several decades. This has resulted in numerous studies trying to understand and categorise what is considered "normal" and "abnormal" in this field. Over the years, what was perceived as "abnormal" became known as sexual deviance (former term to describe paraphilias), paraphilias (atypical sexual practice) or paraphilic disorders (when a paraphilia results in experiencing distress and impairment functioning). Examples of paraphilias include frotteurism, exhibitionism, voyeurism, sexual sadism, fetishism and paedophilia (International Classification of Diseases-11th Revision (ICD-11); World Health Organization, 2018). However, the classification of paraphilias as mental disorders has created debates over the years on the significant influence of societal and cultural values in their definitions as well as perceived criminalisation as opposed to medicalisation of the "disease" (Campbell et al., 2015).

Despite paraphilias being considered "abnormal" or "atypical", research on sexuality has shown that having sexual interest, sexual thoughts or fantasies and/or engaging in behaviours associated with paraphilias are not uncommon in the general population (Joyal, 2015; Joyal et al., 2015; Noorishad et al., 2019). For instance, in their study of normophilic and paraphilic sexual fantasies in a sample of 1,501 adults Joyal (2015) found that 57% of the sample met the DSM-5 criteria for a diagnosis of paraphilia. Noorishad et al. (2019) in a sample of 236 students found that they had experienced nearly half of the sexual fantasies presented to them, some of which were paraphilic. Although paraphilias involving non-consensual sex are less commonly reported, these studies suggest that they are still present in non-clinical and non-forensic populations. A systematic review examining the prevalence of frotteurism (sexual arousal from touching or rubbing against a non-consenting person) found that in samples of non-clinical males the rates of self-reported frotteurism varied between

7.9% to 9.7%, with one study showing a rate of 35% (Johnson et al., 2014). Although illegal in most jurisdictions, paedophilia (i.e. sexual interest in pre-pubescent children) and hebephilia (pubescent children), just like other paraphilias, are also seen in the general population. It is impossible however to obtain an accurate prevalence and understanding of individuals who have sexual interest in children (SIIC), not only due to the paraphilic nature of this interest, but also due to several misconceptions associated with SIIC which might restrain individuals from admitting their sexual interest and seeking help (Berlin, 2014; Jahnke, 2018; Konrad et al., 2017; Stevens & Wood, 2019).

Sexual Interest in Children and Sexual Abuse of Children

SIIC is strongly associated with sexual offences committed against children (i.e. child molestation), however they should not be perceived as synonymous (Berlin, 2014; Gerwinn et al., 2018; Jahnke, 2018). Research shows that individuals who have committed sexual offences against children do not always meet the criteria for paedophilia or admit having a SIIC (Gerwinn et al., 2018). Some argue that situational factors or anti-sociality could explain why some individuals might become sexually interested in or sexually abuse children (Alanko et al., 2013) or that their behaviour could be more opportunistic (i.e. availability and vulnerability of the victim) rather than a genuine sexual interest (Murray, 2000). Similarly, some studies demonstrated that individuals may express having SIIC without acting on their sexual interest (i.e. no sexual contact with children) (Gerwinn et al., 2018; Stevens & Wood, 2019).

On the other hand, studies looking at risk of reoffending in offenders who had committed sexual offences against children found that those with paedophilic interests were at higher risk of reoffending (Hanson & Bussiere, 1998; Seto & Eke, 2015; Seto et al., 2004). In addition, research using non-offender samples also found that between 1% and 7% of their sample admitted hypothetical sexual contact with children if they were certain to avoid

detection (Becker-blease et al., 2006; Briere & Runtz, 1989; Freel, 2003; Smiljanich & Briere, 1996).

Characteristics of Individuals with Sexual Interest in Children

Studies that explored the characteristics of individuals who report SIIC have mostly looked at samples of men rather than women (Fedoroff et al., 1999; Freel, 2003; Fromuth & Conn, 1997), however this can be explained by the fact that research shows that more men than women admit to having this sexual preference (B4uAct, 2011; Baur et al., 2016; Briere et al., 1992; Smiljanich & Briere, 1996).

An online survey conducted in 2011 by the website B4uAct recruited information from 193 individuals from various countries (e.g. USA, Canada, Germany, UK) who self-reported SIIC (they used the term 'minor-attracted person'), 98% of them were male (2% female, *n*= 192) and the majority of them were aged above 30 (64%, *n*= 193), with 30-39 being the largest age group (23%). They also reported high rates of suicidal ideation (45%, *n*= 171) with 13% of them having carried out an attempt to end their life (B4uAct, 2011). In addition, 59% (*n*= 176) shared that they would not seek help from a mental health professional for issues related to their sexual preference, with 62% (*n*=177) believing that they might still be judged by them (B4uAct, 2011). These findings were supported by results from a thematic analysis conducted by Stevens and Wood (2019) on 5,210 posts from over 3,000 individuals who admitted having SIIC who used an online forum (again, the term 'minor-attracted person' was used). The individuals also reported never having offended against children. Their results suggested high prevalence rates of mental health problems: 30% of all the posts mentioned self-harm/suicide, 18% anxiety, 16% depression, 13% addiction and 23% other diagnoses such as personality disorders, OCD and bulimia (Stevens & Wood, 2019). Only 15% of the posts mentioned disclosing their interests to peers, with 3% getting support from family members. In addition, less than a third (27%) of the discussions

were related to seeking psychological or pharmaceutical interventions as a coping strategy to manage their sexual preferences pro-socially (Stevens & Wood, 2019). High prevalence rates of depression and social phobia were also found in another study looking at clinical characteristics associated with paedophilia (Gerwinn et al., 2018).

Other studies explored different correlates of SIIC, such as adverse childhood experiences (ACEs), other paraphilias and level of sexual desire (Gerwinn et al., 2018; Wurtele et al., 2018). Gerwinn et al. (2018) explored the clinical characteristics of individuals who self-reported having paedophilic and/or hebephilic interests according to the ICD-10 criteria. They compared four groups: men who self-reported paedophilic/hebephilic interests and had committed a sexual offence against a child (P+CSO, $n = 83$); men who self-reported paedophilic/hebephilic interests but did not offend (P-CSO, $n = 79$), men who offended against children but did not report paedophilic/hebephilic interest (CSO-P, $n = 32$) and a healthy control group of non-offender men who did not report paedophilic/hebephilic interest (HC, $n = 148$). They found that offenders were generally older and less educated than P-CSO and HC groups and that paedophilic groups showed significantly higher rates of sexual desire (20-25%) than the CSO-P (6%) and the HC (3%) groups. The paedophilic groups showed high rates of other paraphilias (25%) compared to CSO-P (18%) and HC (7%) groups. The most common were voyeurism and frotteurism. They also showed higher rates of personality disorders: 41% of the P+CSO group and 38% of the P-CSO group. With the exception of physical neglect, paedophilic and offender groups reported higher rates of ACEs than the HC group (Gerwinn et al., 2018). Similar results were found by Wurtele et al. (2018) in a sample of 173 male students of which 11% admitted having other sexual interests (i.e. interest in both men and women, children or animals). They found that 21% of the men who reported SIIC also reported having committed child sexual abuse. Their results also showed significant correlations between SIIC and ACEs, early atypical sexual experiences and heightened sexual

interest (Wurtele et al., 2018). These findings suggest higher rates of sexual desire in this population as well as higher prevalence of other paraphilias and mental health issues.

Definition of Sexual Interest in Children

The criteria used to define and diagnose paedophilia might be one of the reasons why it is so often associated with child molestation (Berlin, 2014). The two most common diagnostic manuals used by health professionals and researchers to diagnose and define paedophilia are the Diagnostic and Statistical Manual of Mental Disorders-5th Edition (DSM-5, American Psychiatric Association (APA), 2013) and the International Classification of Diseases-11th Edition (ICD-11, World Health Organization (WHO), 2018). Both manuals define paedophilia as a sexual preference for prepubescent children (13 years old or younger), which is manifested by persistent and intense thoughts, urges, fantasies or behaviours. They also both state that the person having this sexual preference must have acted on these thoughts/fantasies/urges and that these led them to experience distress or interpersonal difficulties (APA, 2013; WHO, 2018). In addition, the DSM-5's criteria also includes that the person must have experienced these thoughts/fantasies/urges/behaviours for a period of six months or more to be diagnosed (APA, 2013).

SIIC is, as one would expect, consistently synonymous with paedophilia. However, there is some debate regarding the definitions and diagnostic criteria used, particularly DSM-5, when exploring the prevalence of SIIC. Some argue that paedophilia, and all other paraphilias or sexual deviance, is a construct mostly based on cultural, social, historical and to some extent religious factors in the western world rather than empirical medical evidence (Berlin, 2014; Bhugra, 2000; Campbell et al., 2015; Joyal, 2018). In addition, the 'act on' criterion might suggest to some people that the person had already committed sexual acts with children, when in fact this might mean that an individual has masturbated to fantasies about children. Added to the fact that SIIC goes against most sociocultural values, this

increases the risk of misconception that individuals with this sexual preference always sexually offend against children (Berlin, 2014; Jahnke, 2018). Other elements of these diagnostic criteria, such as the subjective nature of determining what is 'intense' and the inclusion of sexual fantasies which are known to also be experienced by some members of the general public, are also problematic when studying the issue in non-clinical samples (Berlin, 2014; Joyal, 2018). Seto et al. (2015) also argued that self-reported SIIC should not necessarily be considered paedophilia as the sexual interest could also be the result of other factors such as curiosity or sensation seeking.

In addition, individuals reporting SIIC show a wide variation in age and gender-preference as well as exclusivity of this interest being only for children (Blanchard et al., 2009a; Blanchard et al., 2009b). These studies showed that some individuals who reported being aroused by children older than 13 years old (i.e. hebephilia) also reported being sexually interested in children (aged 13 or younger) and adults simultaneously. This suggests that individuals reporting SIIC do not necessarily have sexual thoughts, fantasies or urges exclusively about pre-pubescent children. Some researchers have argued for a broader terminology such as paedohebe-philia (Bailey et al., 2016) or minor-attracted persons (Stevens & Wood, 2019) which includes age groups other than pre-pubescent children and highlights the importance of definitional clarity when investigating the prevalence of this phenomenon.

Aims of Review

A systematic review uses a strict scientific design, based on pre-specified and reproducible methods, to identify, critically evaluate and summarise the relevant studies from the literature to provide evidence to other researchers and decision-makers (Centre for Reviews and Dissimination, 2009). This review aims to evaluate studies regarding the prevalence and correlates of SIIC across all populations. Due to definitional variations (e.g.

paedophilia, children aged under 13, children under 16) the present review used the term SIIC to define any individuals who reported having sexual interest in, fantasies or urges about children aged 16 and younger.

The present review aimed to answer the following questions: 'What is the prevalence of individuals reporting SIIC?' and 'What are the correlates of SIIC?' This review will complement the existing research literature and enhance clarity regarding the quality of the primary research, in order to inform future research and practice.

Method

The current systematic review adhered to guidelines of the Centre for Reviews and Dissemination (CRD) of the University of York (CRD, 2009), the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) and Methodology Checklist for Systematic Reviews and Meta-analyses (Scottish Intercollegiate Guidelines Network 50; (SIGN 50), 2013). The protocol of the review was registered with PROSPERO, an international prospective register of systematic reviews (PROSPERO registration number CRD42019158584).

Inclusion and Exclusion Criteria

Study Design

Quantitative/descriptive/observational studies were considered suitable for this review. Studies were included if their principal or secondary aim examined (a) the prevalence of SIIC within their sample and/or (b) the correlates of SIIC. To be eligible, studies also had to be peer-reviewed original journal articles and published in English (due to translation limitations). Excluded studies were literature reviews, qualitative studies, case studies, reports, commentaries and editorials.

Exclusion Criteria

As mentioned above, studies exploring sexual interest and behaviours involving children vary in their definition in terms of the children's age. Therefore, to avoid the exclusion of relevant studies, this systematic review included studies based on male and female adults aged 17 and older from the community or from clinical or forensic settings (e.g. prisons, in-patient and out-patient forensic clinics). Studies based on children and adolescents (aged 16 and younger) and individuals with known intellectual disabilities were excluded.

Literature Search Criteria

Search Strategy

A search of the following electronic databases for relevant literature up to November 1, 2019 was conducted by the primary author of this review (VS): ASSIA (Applied Social Sciences Index and Abstracts), EMBASE, Medline, PsychARTICLES, PsycINFO, ProQuest, and Web of Knowledge. The publications were limited to peer-reviewed published journals up to 2019. As electronic searches highly depend on the accuracy of indexing studies on the databases and errors frequently occur (Petticrew & Roberts, 2006), a hand search of the following key journals highlighted in the preliminary search was conducted to avoid possible errors in indexing and therefore the omission of eligible studies: Child Abuse and Neglect, Journal of Child Sexual Abuse, and Sexual Abuse: A Journal of Research and Treatment. Table 1 presents the keywords used in the detailed search strategy.

Table 1

Search Strategy

Search Term String
Sexual interest* in child* OR
paedophil* OR
pedophil* OR
sexual fantas* about child* OR
sexual preference* in child*

*: truncation for multiple endings

Study Selection

The search strategies resulted in a total of 1,492 studies. Removing duplicates and implementing inclusion criteria (i.e. peer reviewed, journal articles and English language) brought the total down to 1,252. In addition, 13 articles were added following a hand search of relevant journals as well as cited references (1,265 potential articles). The primary author screened the titles based on the inclusion and exclusion criteria which resulted in 168 studies being eligible for abstract screening. Discarded studies at this stage were either clearly unrelated to the aims of the systematic review or studied excluded populations. Following the examination of the abstracts of the remaining studies, 49 studies were considered for inclusion in the review. The complete articles of these studies were obtained and read in full which resulted in the exclusion of 22 studies (see Appendix A for reasons for rejection), leaving a total of 27 studies. Figure 1 presents the PRISMA flow chart of the literature search and study selection.

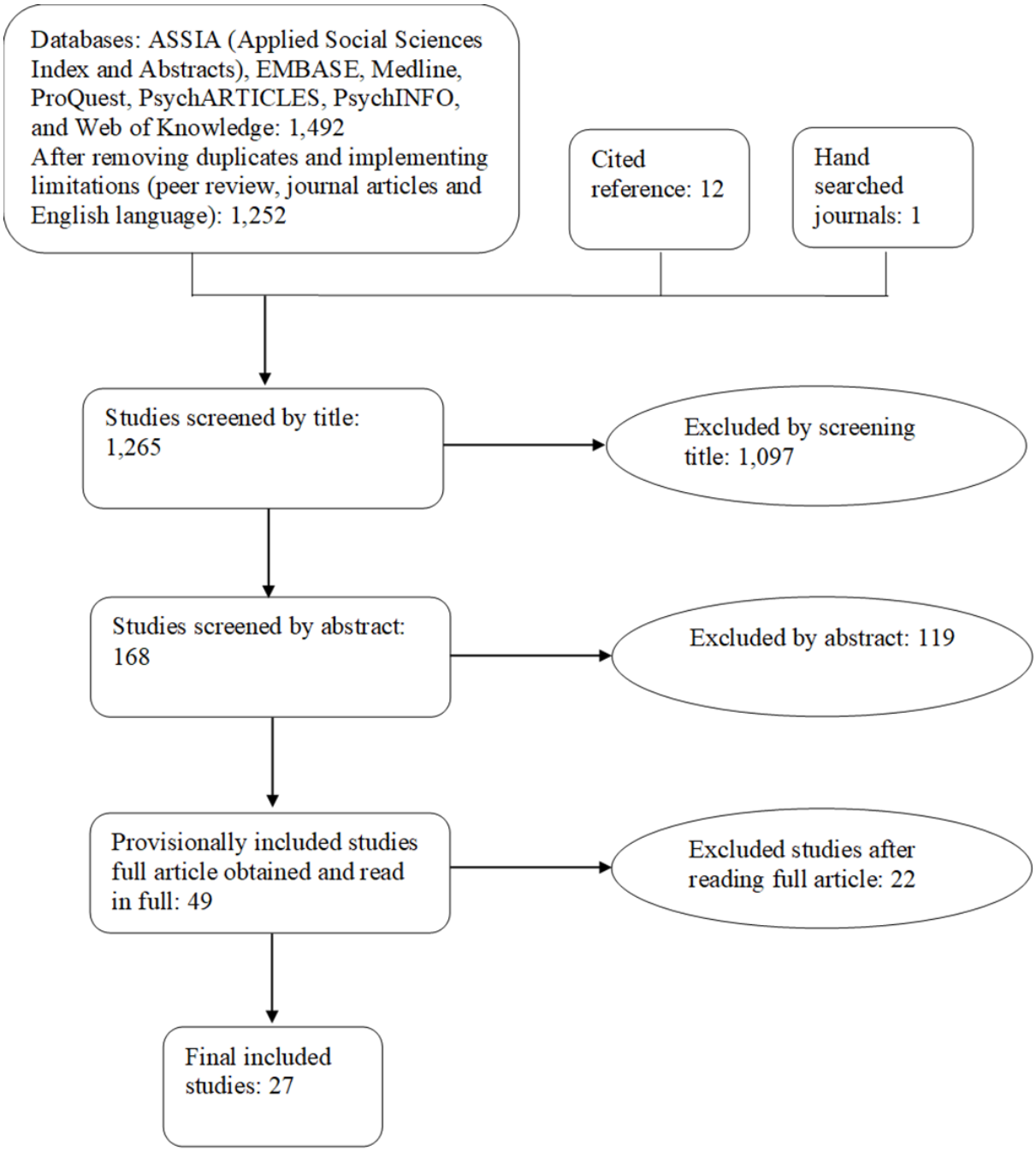

Figure 1. PRISMA flow chart of the literature search process.

Assessment of Risk of Bias

To evaluate the risk of bias of each study a modified quality tool was used, developed by Hoy and colleagues (Hoy et al., 2012, see Appendix B) and based on a systematic search for valid risk of bias assessment tools for prevalence/incidence, observational and cross-sectional studies. Systematic reviews on this topic suggested that existing risk of bias and

quality assessment tools for observational studies examining incidence and prevalence did not provide strong standards for the evaluation of internal and external validity of these studies in comparison to experimental studies (Sanderson et al., 2007; Shamliyan et al., 2010). In addition, in Shamliyan et al.'s (2010) review of the existing tools, they found only five tools which were identified as relevant to prevalence/incidence studies. Based on these findings, Hoy et al. (2012) developed their own risk of bias assessment tool for prevalence studies which is the tool used in this review. The tool includes 10 items and one summary assessment item. The first four items (1-4) assess the generalisability (external validity) of the studies, whereas items 5-10 assess their internal validity. Items were scored either as low (0) or high risk (1) of bias and items where the available information was insufficient were scored as high risk of bias. The summary assessment item (item 11) can be scored as low, moderate or high risk of bias. To explore the tool's interrater reliability, Hoy and colleagues used Kappa statistical analysis on the 11 items for 54 studies and found that 91% of the coded items had a Kappa coefficient of 0.82, therefore almost perfect agreement between raters (Hoy et al., 2012).

In the current review, to verify interrater reliability a second-rater blind to the review randomly rated a third of the studies (n = 9) independently using the suggested categorisation from Sun et al. (2019): score less than or equal to 2 is considered a low risk; score between 3 and 4 is considered a moderate risk; and score higher than or equal to 5 is considered high risk of bias. A 'substantial' interrater agreement was found with Kappa co-efficient .80 and disagreements were reconciled through discussion. The main reason for disagreement related to item 10 (were the numerator(s) and denominator(s) of the interested parameters appropriate) as raters' understanding of its meaning slightly differed. It was agreed that the prevalence rates of included studies were all accurately presented, but most of them did not use a numerator/denominator format due to the non-generalisability of their sample.

Results

Table 2 presents the main findings across all included studies. Tables 3 and 4 present the risk of bias ratings of items related to the studies' external validity and internal validity respectively. The overall summary of risk of bias is presented in table 5.

Summary of Studies

The majority of the studies examined the prevalence of SIIC as their primary aim (*n*= 17, 63%), with the remaining 10 (36%) presenting this specific prevalence while investigating the general prevalence of paraphilias or sexual fantasies. One third of the studies' country of origin was the US (*n*= 9, 33.3%), followed by Canada (*n*= 7, 26%), Germany (*n*= 4, 14.8%), Finland (*n*= 3, 11.1%). One study came from each of the following: Nigeria, Sweden, the Netherlands and the UK. The studies were published between 1980 and 2019, 40.7% of them (*n*= 11) within the past five years.

Samples

Sample sizes varied greatly, ranging from 60 to 8,718 participants, with a mean sample size of 1,217 participants. Five studies recruited their sample from a larger common sample: three studies used the Finnish Genetics of Sexuality and Aggression Study (GSA) sample which comprised of twins from the community aged between 18 and 43 (Alanko et al., 2013; Baur et al., 2016; Santtila et al., 2015) and two studies used the German Prevention Project Dunkelfeld sample which involved the recruitment of self-identified paedophiles and hebephiles from the community (Beier et al., 2009; Schaefer et al., 2010). The samples were collected from the general population in 15 studies (55.6%), from students in eight studies

Table 2

Studies' description and main findings

Author/ year/ country	Source	Setting/ Population	Sample	Definition of sexual interest in children	Study design	Method	Prevalence rates	Other observed variables or correlates
Abdullahi et al. (2015), Nigeria	Sexual Addiction and Compulsivity	University-based Adult males and females Non-clinical Non-offenders	*n*= 871 undergraduate students Men = 447 Women = 394 Mean age = 23.77 (SD = 3.87)	ICD-10 criteria for 9 paraphilias, symptoms lasted for at least 6 months with moderate to severe distress. Paedophilia: sexual focus on children	Cross-sectional Quantitative	Simple random sampling Self-report Questionnaire administered in classrooms	Paedophilia: 0.5% Men = 0.2% Women = 0.8%	Other paraphilias Gender
Ahlers et al. (2011), Germany	Journal of Sexual Medicine	Community-based Adult males Non-clinical Non-offenders	*n*= 367 men aged 40-79 years old Mean age = 57.51 (SD = 10.14) from the Berlin Male Study	DSM-IV-TR A) at least 6 months B) clinically significant distress C) at least 16 years old and 5 years older than the child (usually <14)	Cross-sectional Quantitative	Simple random sampling from a larger sample Contacted by mail Questionnaire + individual assessments using battery of instruments administered in a clinic	Paedophilic interests = 10.4% Paedophilic fantasies = 9.5% Masturbation to those fantasies = 6% Intensely sexually arousing: 26.3%	Other paraphilias Problem awareness Level of distress Level of sexual arousing
Alanko et al. (2013), Finland	Journal of Sexual Medicine	Community-based Adult males Non-clinical Non-offenders	*n*= 3,967 Finnish male twins, aged 21-43	Last 12 months Perpetrator at least 5 years older than the child 3 age groups:	Cross-sectional Quantitative	Sample from the "Genetics of Sexuality and Aggression Study" (GSA)	3% reported sexual interest 2.7% masturbated on fantasies	Age Twins interclass correlation Genetic factors

				0-6; 7-12; 13-15		Confidential survey (post or online)	0.3% sexual behaviours with children under 16	
Bagley et al. (1994), Canada	Child Abuse and Neglect	Community-based Adult males Non-clinical Non-offenders	*n*= 750 men aged between 18-27 years old	Sexual contacts when aged 18 or over with a child (boy or girl) aged < 13 or child (boy or girl) aged 13-16.	Cross-sectional Quantitative	Random sampling, reverse telephone directory Computer programme questionnaire 0- 5 (0 = not interested, 4 = very interested, 5= actual sexual behaviour with children <13)	Sex interest female < 13: 2.66% Sex contact female < 13: 0.67% Sex interest male < 13: 1.86% Sex contact male < 13: 0.5% Sex interest female 13-15: 8.4% Sex contact female 13-15: 5.7% Sex interest male 13-15: 3.2% Sex contact male 13-15: 1.86%	Child abuse experience (emotional, physical, sexual) Sexual interests and activities Mental health
Bailey et al. (2016), USA	Journal of Abnormal Psychology	Community-based Adult males Non-clinical Non-offenders	*n*= 1,189 men Mean age = 33.7 (SD= 13.2)	Paedohebephilia	Cross-sectional Quantitative	Unpaid advertisements online Self-report measures Online questionnaire	28.6% preference for prepubescent females 18.3% preference for prepubescent males 27.6% preference for pubescent females 36.1% preference for pubescent males	Age of onset of sexual interest in children (<15) Sexual experience with women History of sexual offending against children

Baur et al. (2016), Finland	Archives of Sexual Behavior	Community-based Adults Non-clinical Non-offenders	*n*= 5990 18 to 32 years old male (*n*= 2,092) and female (*n*= 3,898) twins	DMS-IV and 5 criteria for paraphilias, including paedophilia Paedophilia: questions about sexual interests, masturbation fantasies, and sexual partners across two specified age groups (0–6, 7–12 years).	Cross-sectional Quantitative	Sample from the "Genetics of Sexuality and Aggression Study" (GSA) Confidential survey (post or online)	Total for paedophilia = 0.6% Male = 0.9% Female = 0.4%	Gender Sexual coercive behaviour Other paraphilias (but paedophilia excluded due to low statistical power)
Beier et al. (2009), Germany	Child Abuse and Neglect	Community-based Adult males Non-clinical Non-offenders	*n*= 358 men from Germany, Austria, Switzerland and England	DSM-IV-TR criteria for paedophilia and self-reported hebephilia (i.e. sexual thoughts, fantasies, urges for pubescent children, lasted at least 6 months and caused distress)	Cross-sectional Quantitative	Self-report Volunteer participants contact phone line, then 90min interview	60.1% met the diagnostic criteria for paedophilia, and 27.7% for hebephilia	Criminal history Sexual history Sexual fantasies and behaviours (exclusive vs non-exclusive) Age Help seeking behaviours
Briere & Runtz (1989), USA	Child Abuse and Neglect	University-based Adult males Non-clinical Non-offenders	*n*= 193 male undergraduate students	Self-reported sexual interest in children	Cross-sectional Quantitative	Recruited in class Survey including self-report items	Sexually attracted: 21% Fantasies: 9% Masturbation during fantasies: 5% Hypothetical sexual contact if could avoid detection: 7%	Attitudes towards sexual violence against women Pornography use Experience of child abuse

Briere et al. (1992), USA	Journal of Research in Personality	University-based Adult males and females Non-clinical Non-offenders	*n*= 318 university students Men =106 Women =212 Mean age = 23.4 (SD= 7.9)	Self-reported likelihood of sexually abusing a child	Cross-sectional Quantitative	Self-report Questionnaire	4.4% reported hypothetical likelihood of having sex with a child; 4.7% men, 4.2% women	Age, gender Pornography Use Experience of child sexual abuse Attitudes towards sexual abuse and interpersonal violence
Briere et al. (1994), USA	Child Abuse and Neglect	University-based Adult males and females Non-clinical Non-offenders	*n*= 314 university students Men = 107 Women = 207	Self-reported information on sexual fantasies about having sex with a child	Cross-sectional Quantitative	Self-report Questionnaire	4% of total sample reported having fantasies of having sex with a child (sometimes – often)	Experience of child sexual abuse Sexual fantasies
Crépault & Couture (1980), Canada	Archives of Sexual Behavior	Community-based Adult males Non-clinical Non-offenders	*N*= 94 men aged 20-45 years old Mean age = 32 Had lived for at least 1 year with a woman	Sexual fantasy: scene where you sexually initiate a young girl and scene where you sexually initiate a young boy	Cross-sectional Quantitative	Volunteer Advertisement by posters and in newspapers Self-report questionnaire and semi-structured interviews	61.7% for young girl 3.2% for young boy	Sexual fantasies outside and during sexual acts with partner and during masturbation Age Frequency of fantasies
Dawson et al. (2016), Canada	Sexual Abuse: Journal of Research and Treatment	Community and university-based Adult males and females Non-clinical Non-offenders	*n*= 1,015 individuals (university students recruited by printed advertisement or in person and general	Sexual activities related to 14 paraphilias including paedophilia and hebephilia.	Cross-sectional Quantitative	Self-report Online survey: 40 items rating sexual arousal on presented sexual activities (only 32 items were related to paraphilias and	Sexual arousal paedophilia: Men = 0.6% Women = 0% Sexual arousal hebephilia: Men = 0.9% Women = 0.1%	Other paraphilias Gender differences Sex drive and preoccupation Neurodevelopmental stress

			population recruited online) Men = 305, mean age 23.0 (SD = 5.6) Women = 710 mean age 21.5 (SD = 4.7)			therefore used in the analysis)		Non-righthandedness Susceptibility to illness Impairment and distress
Dombert et al. (2016), Germany	Journal of Sex Research	Community-based Adult males Non-clinical Non-offenders	*n*= 8,718 men aged 18-89 Mean age = 43.5 (SD = 13.7)	Self-reported sexual interest in children	Cross-sectional Quantitative	Online survey sampling men via a German market research panel	5.5% any indication of paedophilic sexual Interest 4.1% sexual fantasies involving prepubescent children 3.2% sexual behaviour involving prepubescent children: 1.7% child pornography only; 0.8% sexual contact; 0.7% both.	Age Consumption of online IIOC Sexual behaviours and fantasies History of child sexual abuse Child prostitution use
Freel (2003), UK	British Journal of Social Work	Community-based Adult males and females Non-clinical Non-offenders	*n*= 183 child care-workers Women= 92 aged 23–68 (M = 40.5, SD = 10.7) Men= 91 aged 23–62 (M = 38.9,	Self-reported sexual interest in children	Cross-sectional Quantitative	Self-administered questionnaire Recruited from social services	Sexual interest in children 15% male 4% female Sexually attracted to children 12% male, 2% female	Gender, age Experience of child sexual abuse

			SD = 8.5)				Sexual contact with children if avoiding detection 4% male, 2% female	
Fromuth & Conn (1997), USA	Journal of Interpersonal Violence	University-based Adult females Non-clinical Non-offenders	*n*= 546 female university students Majority between 17-21 years old (76%)	Asked about their sexual involvement with individuals at least 5 years younger than themselves	Cross-sectional Quantitative	Self-report Perpetrator and victimisation survey and sexual attraction to children based on Briere and Runtz (1989)	4% met criteria for sexually molesting a child Sexual interest in children: 6% Sexually attracted: 0.6% Fantasies: 2% about girls, 3% about boys Masturbation during fantasies: 1%	Age Experience of offending against children Experience of child sexual abuse Mental health Attitudes towards interpersonal violence
Hall et al. (1995), USA	Behavior Therapy	Community-based Adult males Non-clinical Non-offenders	*n*= 80 men aged 19-66 recruited via advertisements in newspaper Mean age = 38.3 (SD= 10.74)	Female Paedophilic Interest subscale (10 items) of the Sexual Deviance Card Sort	Cross-sectional Quantitative	Sexual Deviance Card Sort (self-reported sexual interest in the presented sexual activities) and penile plethysmograph	20% admitted some paedophilic interest n= 3 (3.75%) engaged in paedophilic behaviours (female child) *n*= 26 physically sexually aroused by slides depicting female child which was equal or exceeded their arousal to female adult slides	Age Level of sexual arousal, penile plethysmograph Inhibition of sexual arousal

Joyal et al. (2015), Canada	Journal of Sexual Medicine	Community-based Adult males and females Non-clinical Non-offenders	*n*= 1,516 men= 717 women= 799 Aged between 18 and 77 years old Mean = 29.6 (SD= 10.8)	Sex Fantasy Questionnaire (Wilson)	Cross-sectional Quantitative and Qualitative	Recruited in one major-city using five different modes of advertisement Online survey	Fantasised about having sex with a child under 12 years old: Men = 1.8% Women = 0.8%	Other sexual fantasies Qualitative content
Joyal & Carpentier (2017), Canada	Journal of Sex Research	Community-based Adult males and females Non-clinical Non-offenders	*n*= 1,040 adults aged between 18-64 years old Women = 565 Men = 475	DSMS-5 paraphilias Prevalence of paraphilic interest was measure by both desire to experience and actual experience, across their lifetime.	Cross-sectional Quantitative	Telephone survey (*n*= 500) and internet questionnaire (*n*= 543) on paraphilic interests. Paedophilia: "Have you ever engaged in sexual activities with a child aged 13 years old or less after you were an adult?"	Desire to have sex with a child: Overall = 0.6% Men = 1.1% Women = 0.2% Actual sexual behaviour with a child: Overall = 0.4% Men = 0.6% Women = 0.2% *telephone survey = 0%; internet survey= 0.7%	Age, gender Current sexual life (e.g. use of pornography, sexual satisfaction) Childhood sexual experience with older persons Paraphilic interests
Mundy & Cioe (2019), Canada	The Canadian Journal of Human Sexuality	Community-based and university-based Adult males and females Non-clinical Non-offenders	*n*= 529 Men = 173 (44 psychology students and 129 general population) Women = 356 (215 psychology students and 141 general population)	DSM-IV-TR and DSM-5 criteria. Participants were categorised as having a paraphilic interest if they rated their level of paraphilia-associated sexual arousal	Cross-sectional Quantitative	Sexual Life and Sexual Behaviour Questionnaire (SLSB) Self-report online questionnaire	Sexual arousal to prepubescent females: 0.1% men, 0.3% women prepubescent males: 0.01% men, 0.8% women pubescent females: 9% men, 0.6% women	Paraphilic interests and behaviours Age, gender Life and sexual satisfaction

				as very or extreme.			pubescent males: 0% men, 0.3% women	
Santtila et al. (2015), Finland	Journal of Child Sexual Abuse	Community-based Adult males Non-clinical Non-offenders	*n*= 1,310 male twins between 33 and 43 years of age (M = 37.56) from the "Genetics of Sexuality and Aggression Study" (GSA)	For sexual interest in children aged 12 years and younger = paedophilia proper For sexual interest in any person aged 15 or younger = paedophilia-hebephilia combined.	Cross-sectional Quantitative	Self-report survey on sexual interest over the past 12 months (incidence) and other questionnaires (e.g. child trauma).	Incidence: Paedophilia proper = 0.2% (CI= 0% - 0.5%) Hebephilia =3.1% (CI= 2.1%- 4.0%) Paedophilia-hebephilia combined = 3.3% (CI= 2.4%- 4.3%)	Age Experience of child sexual abuse Sexual fantasies Fantasies during masturbation Sexual desire Level of denial/ minimisation Exclusive vs non-exclusive
Schaefer et al. (2010), Germany	International Journal of Law and Psychiatry	Community-based Adult males Non-clinical Non-offenders	*n*= 160 men aged 18-64 M= 34.15 (SD= 9.917)	Sexual preference for minor, including prepubescent (paedophilia) and pubescent (hebephilia) children Definition based on Blanchard et al., 2009)	Cross-sectional Quantitative	Self-reported data Multi-method assessment including computer assisted telephone interview (CATI), clinical interview and a battery of questionnaires.	39.4% reported sexual contact with children <16 65.0% sexual fantasies about prepubescent children 89.4% sexual fantasies about pubescent children	Age Mental health Legal status Age, gender and number of victims Offender/victim relationship Perceived risk of (re)offending Help seeking behaviour
Seto et al. (2015), Sweden	Archives of Sexual Behavior	University-based Adult males Non-clinical Non-offenders	*n*=1,978 men aged 17-20 Mean age =18 (SD=0.6)	Age of children in sexual interest questions were divided as	Cross-sectional Quantitative	School-based survey Self-report on various variables including the	Likely to have sex with a child: 12-14 = 33.8% 10-12= 5.8% <10= 4.2%	Age Non-sexual antisocial behaviours and substance misuse

				follow: 12-14; 10-12 and <10.		likelihood of having sex with a child (3 different age groups) if they could avoid getting caught.		Offence supportive attitudes and beliefs
Smiljanich & Briere (1996), USA	Violence and Victims	University students Adult males and females Non-clinical Non-offenders	*n*= 289 undergraduate students Men = 99 Women = 180 Aged 17-56 Mean age = 28.1 (SD= 9.5)	Self-reported fantasies and sexual interest in the past 12 months (based on Briere & Runtz, 1989)	Cross-sectional Quantitative	Self-report questionnaires including various variables (e.g. fantasies, sexual interest in children)	Previous sexual attraction= 9.8% Sexual fantasies= 2.2% Hypothetical sexual contact if not detected = 1.1%	Gender, age Experience of child sexual abuse Experience of child psychological mistreatment Pornography use
Templeman & Stinnett (1991), USA	Archives of Sexual Behavior	University-based Adult males Non-clinical Non-offenders	*n*= 60 undergraduate students aged 18-50 Mean age = 21.5	Stimuli were divided in four female age groups: 1) 0 to 6 years old 2) 6 to 12 years old 3) 12 to 18 years old 4) adult	Cross-sectional Quantitative	Self-report Sexual history questionnaire looking at sexual arousal level for various sexual activities (including sex with children) and sexual orientation	3% had sexual contacts with girls <12 2% had sexual contacts with girls 13-15 5% desire for sexual contacts with girls <12 12% desire for sexual contacts with girls 13-15	Sexual orientation General sexual history Sexual offending History of child sexual abuse Other paraphilias
Williams et al. (2009), Canada	Criminal Justice and Behavior	University-based Adult males Non-clinical Non-offenders	Study 1 *n*= 103 male undergraduate students Mean age = 19.7 years old	Sexual deviance: unusual arousal source Based on DSM-IV-TR paraphilias	Cross-sectional Quantitative	Participation for course credit Self-report questionnaire packages	13% reported having paedophilic sexual fantasies in study 1; 11% in study 2	Deviant sexual fantasies and behaviours Age Pornography use

			Study 2 *n*= 88 male undergraduate students Mean age = 20.4 years old (SD = 2.97)	Sexual fantasy: all imagined forms of sexual activities, deviant or otherwise			5% reported having engaged in paedophilic sexual behaviours in both studies	Personality traits
Wilpert (2018), The Netherlands	Journal of Forensic Psychiatry and Psychology	Adult males Clinical Offenders and non-offenders	*n*= 499 males aged 17 to 78 from an outpatient forensic treatment clinic Mean age = 42.83 (SD = 13.41)	Self-report and DSM-IV-TR diagnosis	Cross-sectional Quantitative	Self-report inventory based on Sexual Outlet Inventory looking at 8 paraphilias from DSM-IV-TR and professional diagnosis	Self-reported paedophilia = 19.8% Diagnosed paedophilia =23.6%	Age Paraphilic interests Diagnosed vs self-reported paraphilia Offending history
Wurtele et al. (2014), USA	Sexual Abuse: Journal of Research and Treatment	Community and university-based Adult males and females Non-clinical Non-offenders	*n*= 435 individuals Men = 173 Women = 262 from two samples: 246 psychology students and 189 internet marketplace	Self-report sexual interest in children	Cross-sectional Quantitative	Online survey on sexual experience and attitudes including sexual orientation, sexual preference and adverse childhood experience	Whole sample = 2% sexually attracted to children; 2% fantasised about sex with children; 2% masturbated to fantasies about sex with children	Age, gender Sexual orientation Antisocial behaviours Adverse childhood experiences Attachment style Early sexual experiences

(29.6%), three studies (11.1%) had a mixed sample of university students and individuals from the general population and one study collected data from a clinical sample (3.7%). The age range for the 27 studies varied between 17 and 89 years old with a mean of 22.2: over one third of the studies used university student samples. Eight studies did not provide a mean age and of these three did not provide the participants age. Where information was available, the mean age for university samples was 24.6, 36.3 for general population samples and 42.8 for the clinical sample.

Definition Used

Definitions of SIIC in the present studies could be divided into two main categories: 1) definition based on diagnostic manuals and 2) studies using their own definition of SIIC.

A total of seven studies used the criteria for paedophilia from the DSM manual (fourth and fifth editions) and one the criteria from ICD-10 manual (Abdullahi et al., 2015). Of these eight studies, five investigated only paedophilic sexual interest, that is sexual arousal/urges/fantasies about pre-pubescent children (usually under 14) only (Abdullahi et al., 2015; Ahlers et al., 2011; Joyal & Carpentier, 2017; Williams et al., 2009; Wilpert, 2018) and three investigated both paedophilic and hebephilic interest (Baur et al., 2016; Beier et al., 2009; Mundy & Cioe, 2019). They all used self-report questionnaires to collect their data, but Wilpert (2018) also compared clinical diagnosis (DSM-IV-TR) and self-report in her sample of 499 individuals from a treatment clinic for sexual offenders.

Of the 19 studies who used their own definition of SIIC, 10 only investigated sexual interest/fantasies in, or behaviours with, pre-pubescent children and eight studies examined sexual interest in both pre-pubescent and pubescent children. One study asked female university students about their sexual involvement with individuals at least 5 years younger than themselves (Fromuth & Conn, 1997), therefore the age of the individual involved in the self-reported sexual contact could not be determined.

Procedure Used

All studies used self-report questionnaires to collect data on SIIC. Eleven of them administered their questionnaire online, by post or via telephone and 16 asked their participants to complete the questionnaire at the recruitment location. Sixteen studies used additional scales to assess correlates such as ACEs (Bagley et al., 1994; Briere, 1994; Briere et al., 1992; Dombert et al., 2016; Freel, 2003; Fromuth & Conn, 1997; Joyal & Carpentier, 2017; Santtila et al., 2015; Smiljanich & Briere, 1996; Templeman & Stinnett, 1991; Wurtele et al., 2014) and attitudes towards interpersonal violence (Briere et al., 1992; Briere & Runtz, 1989; Fromuth & Conn, 1997; Seto et al., 2015). Five studies also conducted semi-structured clinical interviews to collect their data (Beier et al., 2009; Crépault & Couture, 1980; Hall et al., 1995; Joyal & Carpentier, 2017; Schaefer et al., 2010) and one of these used phallometric measurement as part of their procedure (Hall et al., 1995).

Prevalence

Due to the differences in definition and range of ages used to assess SIIC, the prevalence rates varied greatly. Additionally, some studies presented their prevalence rates based on the gender of their respondents (i.e. men or women) or based on the gender and/or age of the children in the sexual preference (e.g. SIIC in pre-pubescent boys) rather than providing prevalence rates of SIIC for the whole sample. Studies also provided prevalence rates of clinical diagnosis of paedophilia, sexual fantasies about children, masturbation when fantasising about having sex with children, hypothetical sexual contact with children if not caught, and sexual contact with children. All of these could be potentially seen as reporting SIIC.

Sexual Interest in Pre-pubescent Children. When including every element such as sexual fantasies and diagnoses of paedophilia in the definition of sexual interest in pre-pubescent children (aged 13 or younger), the prevalence rates ranged from 0.2% to 65% with

a mean of 16.1% (*n*= 21 studies). However, when excluding sexual fantasies, masturbation, diagnosis, hypothetical and actual sexual contact with children, the prevalence of self-reported sexual interest in pre-pubescent children varied between 0.2% and 21%, with a mean of 6.8% (*n*= 19 studies).

Sexual Interest in Pubescent Children. The prevalence of self-reported sexual interest in pubescent children (aged 14 to 16) ranged from 0.9% and 89.4% with a mean of 21.03% (*n*= 6 studies) when including sexual fantasies and diagnosis of hebephilia in the definition. When these are excluded, the prevalence varied between 0.9% and 3.1% with a mean of 2.28% (*n*= 4 studies) (Alanko et al., 2013; Dawson et al., 2016; Santtila et al., 2015; Templeman & Stinnett, 1991).

Sexual Fantasies and Masturbation to those Fantasies. A total of nine studies looked at reported sexual fantasies about children (pre-pubescent) with a mean prevalence rate of 12.3% (range 1.8% - 65%) (Ahlers et al., 2011; Briere, 1994; Briere & Runtz, 1989; Dombert et al., 2016; Joyal et al., 2015; Schaefer et al., 2010; Smiljanich & Briere, 1996; Williams et al., 2009; Wurtele et al., 2014) and only one study looked at sexual fantasies about pubescent children and obtained a prevalence rate of 89.4% (Schaefer et al., 2010). Five studies also looked at the number of people reporting masturbating to fantasies about pre-pubescent children with a mean prevalence rate of 2.9%, ranging from 0.4% to 6% (Ahlers et al., 2011; Alanko et al., 2013; Briere & Runtz, 1989; Fromuth & Conn, 1997; Wurtele et al., 2014) and one study examined masturbation to sexual fantasies about pubescent children with a prevalence of 2.6% (Alanko et al., 2013).

Hypothetical and Actual Sexual Contact with Children. Studies which asked respondents if they would have sexual contact with a child assuming that they would not be caught found self-reported prevalence rates varying between 1.1% and 7% with a mean of 4.1% (*n*= 4 studies) (Briere et al., 1992; Briere & Runtz, 1989; Freel, 2003; Smiljanich &

Briere, 1996). When looking at individuals who self-reported having had actual sexual contact with children (pre and pubescent children), the mean prevalence rate was 7.34% (*n*= 7 studies), ranging from 0.05% to 39.4% (Alanko et al., 2013; Dombert et al., 2016; Fromuth & Conn, 1997; Hall et al., 1995; Joyal & Carpentier, 2017; Schaefer et al., 2010; Templeman & Stinnett, 1991). However, the highest prevalence rate from these studies (i.e. 39.4%) was obtained from research targeting individuals who already admitted having SIIC and included men who self-reported having committed sexual offences against children without being detected (i.e. Dunkelfeld offenders), which was 39.4% (*n*= 63) of their sample (*n*=160) (Schaefer et al., 2010). It is therefore possible that by recruiting solely men admitting SIIC, Schaefer et al.'s (2010) sample had a higher probability of recruiting individuals who had committed sexual offence against children compared to general population samples with lower percentages of individuals self-reporting SIIC. When excluding this study as an outlier, the mean prevalence rate was 2% in the general population (range = 0.05% - 4%).

Prevalence Rates divided by Specific Gender and/or Age Preferences. Five studies presented their prevalence rates in terms of the individuals' sexual preferences regarding the age and gender of the children they reported being attracted to.

Bagley et al. (1994) presented the prevalence rates of SIIC and actual sexual contact with children (after the individual reached 18 years old) of 750 men from the general public according to the age and gender of the children. They found that the prevalence rate of sexual interest in female children aged 12 or younger was 2.7% and the prevalence of actual sexual contact was 0.7%. The prevalence rate of sexual interest in male children aged 12 or younger was 18.7% and the prevalence rate of actual sexual contact was 0.5%. With older children, the prevalence rate of sexual interest in female children aged between 13 and 15 years old was 8.4% and actual sexual contact was 5.7%. The prevalence rate of sexual interest in male

children aged between 13 and 15 years old was 3.2% and actual sexual contact was 1.9% (Bagley et al., 1994).

Bailey et al. (2016) also investigated the prevalence rate of SIIC of 1,189 men recruited from websites for adults attracted to children according to the age and gender of the children. They divided the age into the following four categories: paedophilic interest (10 years or younger); hebephilic interest (aged between 11 and 14); ephebophilic interest (15 to 16); teleiophilic interest (17 and older). They presented their results according to general sexual preferences but also as exclusive sexual preferences (i.e. individuals who reported being sexually attracted/interested in this gender and age only). For the purpose of this review, the general sexual preference prevalence rates were presented. Regarding sexual interest in females, the prevalence rate for paedophilic interest was 28.6%, for hebephilic interest was 27.6%, for ephebophilic interest was 10.5% and for teleiophilic interest was 13.6%. As to sexual interest in males, the prevalence rate for paedophilic interest was 18.3%, for hebephilic interest was 36.1%, for ephebophilic interest was 8% and for teleiophilic interest was 5.4% (Bailey et al., 2016).

Crépault and Couture (1980) examined self-reported sexual fantasies of a sample of 94 men from the general population, including if they had fantasies about sexually initiating a young girl or sexually initiating a young boy. They found that 61.7% of the sample reported sexual fantasies about initiating sex with a young girl and 3.2% with a young boy (Crépault & Couture, 1980). Again, these prevalence rates appeared much higher than other rates presented in the other studies regarding female children, but these were collected in the context of sexual fantasies, not reported sexual interest/attraction and the age of the children was not defined.

Mundy and Cioe (2019) looked at paraphilic interests in 173 men and 356 women from the general population, including SIIC. Their prevalence rates were presented according

to the respondents' gender as well as according to the gender of the child in the sexual preferences, therefore these rates are presented in the section below.

Seto et al. (2015) investigated the prevalence and correlates of viewing child sexual exploitation material (CSEM), including interest in having sex with children, in 1,978 male university students. The prevalence rates were divided within three age groups: children aged under 10; 10-12 and 12-14. Over a third (33.8%) reported a likelihood of having sex with children aged 12-14, 5.8% with children aged 10-12 and 4.2% with children under 10 (Seto et al., 2015).

Differences Between Groups.

Age. Only two studies compared the age of the participants to the SIIC prevalence rates and both found that individuals who reported SIIC tended to be younger than the ones who did not (Alanko et al., 2013; Santtila et al., 2015).

Gender. A total of ten studies compared responses between male and female participants on the SIIC prevalence rates but also on other associated variables. All but one study indicated that men reported higher rates than women. A study conducted in Nigeria looking at the prevalence of paraphilias in a sample of university students obtained a prevalence rate of paedophilia of 0.2% for men and 0.8% for women, however this difference was not found to be statistically significant (Abdullahi et al., 2015). As to the other studies, the prevalence rates of SIIC for men ranged from 0.9% to 22.2% with a mean of 7.5% (*n*= 6 studies) as opposed to women with a range between 0.2% and 4% with a mean of 1.7% (*n*= 6 studies) (Baur et al., 2016; Freel, 2003; Joyal & Carpentier, 2017; Joyal et al., 2015; Smiljanich & Briere, 1996; Wurtele et al., 2014). Briere et al. (1992) compared the prevalence rate of the likelihood of engaging in sexual contact with a child between men and women from a community sample and found that 4.7% of men endorsed that item compared to 4.2% of women. In their study looking at the prevalence of paraphilia in a non-clinical

sample of men and women, Dawson et al. (2016) did not present the prevalence rates as a percentage but found that men were significantly more likely to report items associated with frotteurism, hebephilia and paedophilia than were women. Similar results were reported by Mundy and Cioe (2019) who found that men were generally more likely to report SIIC than women. However, when looking at the percentage within their subgroups (i.e. men or women) and at specific child's gender and age, results varied slightly. More women than men endorsed items related to engaging in sexual behaviour with a child. Also, a higher percentage of women admitted to masturbating to fantasies about pre-pubescent males as opposed to the male respondents. However, more men than women endorsed items related to female pubescent children and items related to sexual fantasies about children (Mundy & Cioe, 2019).

Offending History. Only one study compared the prevalence rates of SIIC between different types of offenders. Wilpert (2018) compared self-reported paraphilias with diagnosed paraphilias within a sample of individuals attending a sexual offender outpatient clinic. She compared findings between individuals who committed a contact sexual offence against a child (CM), individuals who committed offences related to downloading child sexual abuse material (CAMD) and individuals who committed various sexual offences including voyeurism or a combination of CM and CAMD (miscellaneous). She found that overall, the prevalence rate of self-reported paedophilia was statistically significantly lower (19.8%) than diagnosed paedophilia (23.6%). Her results also suggested that the CM group had significantly more paedophilic interest than the two other groups, with the CAMD group obtaining the lowest prevalence rate (Wilpert, 2018).

Other Correlates of Sexual Interest in Children

As well as gender, age and offending history, some studies also explored other correlates of SIIC. For instance, the presence of other paraphilic interests, mental health

problems, ACEs, problem awareness and help-seeking intention/behaviours and antisocial attitudes/behaviours.

Other Paraphilias. Seven studies provided the prevalence of SIIC by exploring the prevalence of different paraphilias or paraphilic interests, but only four of them investigated the link between other paraphilias and paedophilia. In a sample of 358 men who admitted having SIIC, 27 (8.6%) reported being sexually aroused by at least one other paraphilic scenario, fetishism and sadism being the most rated ones, and 17 (5.4%) admitted sexual arousal to two or more other paraphilic scenarios (Beier et al., 2009). Wurtele et al. (2014) asked a sample of 435 men (*n*= 173) and women (*n*= 262) from the general public to complete Attraction to Sexual Aggression Scale which looked at the likelihood of engaging in criminal and non-criminal activities if being assured that they would not get caught or punished for it. The scale included items associated with SIIC but also related to engaging in sexual activity with a dead person, an animal, and sexually assaulting an adult. In their sample, 28 individuals (men = 17, women= 11) reported SIIC which was correlated with the three other paraphilic items (Wurtele et al., 2014). Wilpert (2018) conducted a correlation analysis between the paraphilias presented in her study and found that diagnosed paedophilia (not self-reported) only significantly correlated with diagnosed (not reported) exhibitionism. On the other hand, Joyal and Capentier (2017) found no significant correlations between paedophilia and other paraphilias.

Mental Health Problems. Of eight studies using diagnostic definitions of paedophilia only five provided specific information about personal and mental health problems in their sample. Bagley et al. (1994) found significant correlations between the presence of depression, somatic anxiety, free-floating anxiety and suicidal ideation and SIIC below the age of 13 and sexual interest in males between the ages of 13 and 15 years old in a sample of 750 men. In a sample of 160 men admitting SIIC (Schaefer et al., 2010), 73.8% of

them reported experiencing severe levels of distress associated with their sexual preference, 12.5% reported moderate levels of distress and 7.3% reported experiencing no distress at all. In addition, 31.1% reported having been admitted to hospital at least on one occasion for mental health problems associated with their sexual preference, 5%, had psychotherapy in an outpatient clinic and 7.5% admitted having problems with drug and alcohol misuse. Ahlers et al. (2011) found that 5.3% of the 38 men who reported paedophilic interest also reported experiencing distress associated with this. Smiljanich & Briere (1996) looked at correlates of individuals who reported SIIC. Using only the male sample as the level of females who reported SIIC was too low for statistical analysis, they found that men who reported SIIC (*n*= 22) also reported lower self-esteem, more sexual conflicts, higher sexual impulsivity and lower socialisation than men who did not have SIIC (*n*= 77). Much lower levels of distress were found by Dombert et al. (2016) in their sample of 8,718 participants, with only 0.1% of them reporting experiences of distress related to their SIIC.

Adverse Childhood Experiences (ACEs). In addition to mental health and personal problems, several studies investigated the link between ACEs, including childhood sexual abuse, and having SIIC. A total of seven studies looked at that association. Three of these studies did not find significant correlations between SIIC or paedophilia and the presence of ACEs (Briere, 1994; Joyal & Carpentier, 2017; Smiljanich & Briere, 1996). Bagley et al. (1994) investigated the prevalence of ACEs and its association with self-reported sexual interest and activity involving children in a sample of 750 men. They found that the combination of childhood sexual and emotional abuse was the strongest predictor of sexual interest and activity involving pubescent males and pre-pubescent children of either sex. They also found that multiple episodes of sexual abuse in childhood was strongly associated with engaging in sexual activities with children of all age and gender with the exception of female aged between 13 and 15 years old (Bagley et al., 1994).

Freel (2003) compared the prevalence of SIIC between male (*n*= 100) and female (*n*= 100) care workers and also between those who experienced sexual abuse as a child and those who did not. No significant differences were found on self-reported SIIC between women who did experience sexual abuse as a child and women who did not (6% and 4%, respectively). However, significant differences were found between men, with more than twice the percentage of men who experienced childhood sexual abuse reporting SIIC compared to men who reported this interest but did not experience child sexual abuse (29% and 14%, respectively). In their study looking at the prevalence of undetected child molestation perpetrated by women, Fromuth and Conn (1997) found that 77% of the women who admitted having perpetrated a sexual offence against a child in their lifetime reported having experienced at least one event that fitted their definition of child sexual abuse.

Santtila et al. (2015) investigated the association between the presence of SIIC with an individual's own experience of child sexual and non-sexual abuse. Using an online sample of 1,310 men they found that both types of abuse combined were significantly associated with an increased probability of SIIC, however no significant association was found when conducting the analysis on each type of abuse separately.

Wurtele et al. (2014) asked 435 participants to complete the Childhood Experiences Behavior Questionnaire and the Childhood Attachment Questionnaire to explore the association between reported SIIC and ACEs and attachment styles. They investigated the differential effect of the following eight ACEs on gender and reported sexual interest: childhood sexual abuse, early exposure to pornography, emotional abuse, physical abuse, domestic violence, animal abuse and anxious and avoidant attachment bonds. They found an association between anxious attachment style and avoidant attachment with self-reported SIIC for both male and female participants. A strong association was also found with experience of sexual abuse as a child. In addition, male participants who reported SIIC also

reported several other adverse experiences such as childhood exposure to pornography, emotional and physical abuse, witnessing domestic violence, and perpetrating animal abuse (Wurtele et al., 2014).

Problem Awareness and Help-Seeking Behaviours. Five studies explored individuals' level of awareness of problems that their SIIC might cause as well as the proportion of individuals who have already sought help or have been thinking about seeking help from professionals and /or non-professionals such as friends and family. In terms of problem awareness, Ahlers et al. (2011) found that only one man (of the 38 men who reported having SIIC) admitted perceiving it as a problem. In contrast, the other studies investigating this element found much higher rates. For instance, in Bagley et al.'s (1994) study of the 43 men who reported having sexual interest/contact with children under 13 years old, about half of them expressed wanting help with their problem. They also found that the great majority of the 14 men who reported sexual interest in male children under 13 and almost half of the 24 men who reported sexual interest in male children between 13-15 expressed wishing that someone could help them with their problems (85.7% and 41.7%, respectively). The perceived need for help appeared to decrease when the children were females as 35% of the 20 men who reported sexual interest in female children below 13 and 6.3% of the 63 men who reported sexual interest in female children between 13 and 15 years old admitted wishing they could get help with their problems (Bagley et al., 1994). Similar results were found in Dombert et al.'s (2016) study where 38.5% of men who reported sexual fantasies about both male and female children indicated higher need for help as opposed to 7.1% of men of reported sexual fantasies just about female children. Overall they found that 12.6% of men who reported any SIIC expressed having thought of seeking help due to their sexual interest (Dombert et al., 2016).

Beier et al.'s (2009) findings from their subsample of 247 paedophiles and hebephiles indicated that 85.7% of them had already disclosed their sexual preference for children to someone (i.e., friends, family members, partners). Of the 273 paedophiles and hebephile who provided information on seeking professional help, 46.5% (*n*= 127) had recently (within the last 6 months of the study) sought help from their GP or a mental health professional. Of the remaining individuals (*n*= 146), only 26% of them (*n*= 38) reported that they wished to consult a professional. From their sample of 160 men who reported SIIC, Schaefer et al. (2010) found that 71.3% of the overall sample sought help due to their sexual interest, of those 56.3% sought help from non-professionals and 45% from professionals.

Antisocial Attitudes/Behaviours. To investigate potential associations between SIIC and liberal attitudes towards sexual abuse and interpersonal violence, four studies used the Acceptance of Interpersonal Violence scale (AIV; Burt, 1980) and two of those also used the Attitudes Toward Sexual Abuse scale (ATSA; Briere et al., 1992). Briere and Runtz (1989) found significant correlations between reported sexual attraction to children and the AIV responses, however this correlation was not supported by Briere et al. (1992) or Smiljanich and Briere (1996). Using their own scale (ATSA), Briere et al. (1992) found significant correlations between attitudes toward sexual abuse and individuals who reported sexual interest in male children and those who reported a likelihood to have sexual contact with children of either gender if assured that they would not be caught. However, when this was replicated by Smiljanich and Briere (1996), no significant correlation was found either for ATSA or AIV. Similarly, Formuth and Conn (1997) used the AIV as well as the Rape Myth Acceptance and the Adversarial Sexual Beliefs Scale (Burt, 1980) and found no significant difference between perpetrators of child sexual abuse and non-perpetrators on those scales.

In terms of engaging in antisocial or criminal behaviours (other than sexual contact with children), Dombert et al. (2016) found that 2.4% of their sample reported consuming

CSEM online. Seto et al. (2015) also found significant correlations between the consumption of CSEM online and reported SIIC. In their study, Wurtele et al. (2014) investigated potential associations between SIIC and hypothetical engagement in antisocial behaviours (i.e. likelihood of committing a criminal offence or engaging in non-criminal antisocial behaviours if assured that they would not be punished/caught). They found significant differences between individuals who self-reported SIIC (*n*= 28) and those who did not (*n*= 406) on the likelihood of robbing a bank, the likelihood of committing a murder, engaging in sexual activity with a prostitute, viewing sexually explicit websites, sending sexually explicit photos or videos via their phone and as reported above, engaging in sexual acts associated with coercive sadism, zoophilia and necrophilia. For female respondents only, another significant difference was found for the likelihood of driving under the influence of drugs or alcohol (Wurtele et al., 2014). For all these significant differences, a greater proportion of individuals who self-reported SIIC endorsed the behaviours as opposed to individuals who did not report it. They also found that 6% of the whole sample (*n*= 435) admitted to the likelihood of viewing CSEM online if they could avoid detection.

Risk of bias assessment

External Validity

The scores for external validity items for each study are presented in Table 3. For the purpose of this review, the lead investigator considered 16 studies to have poor external validity as they had three or four of the four items present (scored 1), ten studies were considered to have acceptable external validity, having two items present, and only one study was found to have good external validity scoring only on one item.

Table 3

Risk of bias items related to external validity (Hoy et al. 2012)

Studies	Target population	Sampling frame	Random sampling	Non-responders bias

Abdullahi et al. (2015)	1	1	0	1
Ahlers et al. (2011)	1	0	0	1
Alanko et al. (2013)	0	0	1	1
Bagley et al. (1994)	1	0	0	1
Bailey et al. (2016)	1	1	1	1
Baur et al., (2016)	1	0	1	1
Beier et al. (2009)	0	0	1	1
Briere & Runtz (1989)	1	1	1	1
Briere et al. (1992)	1	1	1	1
Briere et al. (1994)	1	1	1	1
Crépault & Couture (1980)	1	1	1	1
Dawson et al. (2016)	0	0	1	1
Dombert et al. (2016)	0	0	1	1
Freel (2003)	1	1	1	1
Fromuth & Conn (1997)	1	1	1	1
Hall et al. (1995)	1	1	1	1
Joyal et al. (2015)	0	0	1	1
Joyal & Carpentier (2017)	0	0	0	1
Mundy & Cioe (2019)	1	1	1	1
Santilla et al. (2015)	1	0	0	1
Schaefer et al. (2010)	0	0	1	1
Seto et al. (2015)	1	0	0	1
Smiljanich & Briere (1996)	1	1	1	1
Templeman & Stinnett (1991)	1	1	1	1
Williams et al. (2009)	1	1	1	1
Wilpert (2018)	1	1	1	1
Wurtele et al. (2014)	1	1	1	1

Target Population. The great majority of the studies (*n*= 20) included in this review did not manage to obtain a sample representative of the targeted national population studied. The main factors influencing this item were the wide use of university samples (e.g. Abdullahi et al., 2015; Briere, 1994; Briere et al., 1992; Briere & Runtz, 1989; Fromuth & Conn, 1997; Mundy & Cioe, 2019; Seto et al., 2015; Smiljanich & Briere, 1996; Templeman & Stinnett, 1991; Williams et al., 2009; Wurtele et al., 2014) or age limits in recruitment methods (e.g. Ahlers et al., 2011; Bagley et al., 1994; Baur et al., 2016).

Sampling Frame. Slightly more than half of the studies (*n*= 15) did not use a sampling frame close to the targeted population by, for instance, recruiting only psychology

students (e.g. Mundy & Cioe, 2019; Wurtele et al., 2014) or using recruitment methods that only targeted certain people (e.g. advertising in sports section in Sunday newspaper; Hall et al., 1995).

Random Selection. Three studies used simple random sampling (Abdullahi et al., 2015; Ahlers et al., 2011; Bagley et al., 1994) and three others used a randomised technique such as census in their recruitment method (Joyal & Carpentier, 2017a; Santtila et al., 2015; Seto et al., 2015).

Non-Respondents Bias. All 27 studies scored a yes (1) in terms of risk of non-respondent bias. A total of eight studies reported their response rates, but only three studies explored the difference between respondents and non-respondents or the studied population (Ahlers et al., 2011; Dombert et al., 2016; Joyal & Carpentier, 2017) but all of them found significant differences. Two studies did not provide their response rates but compared their sample's characteristics to those of the studied population, but again found significant differences (Joyal et al., 2015; Wurtele et al., 2014). The remaining 19 studies did not mention response rates or comparisons with non-respondents or the studied population.

Internal Validity

The internal validity of the studies included in this review was assessed by the six items presented below and ratings are presented in Table 4. Overall, none of the studies showed poor internal validity (i.e. scoring a yes on 4-6 items out of 6). Acceptable internal validity was found in 19 studies (i.e. scoring a yes on 2-3 items out of 6) and eight were considered to have good internal validity (i.e. scoring 0-1 item out of 6).

Table 4

Risk of bias items related to internal validity (Hoy et al., 2012)

Studies	Proxy or not	Definition	Validity/ reliability	Collection mode	Prevalence period	Numerator/ denominator

Abdullahi et al. (2015)	0	0	1	0	1	0
Ahlers et al. (2011)	0	0	0	0	1	0
Alanko et al. (2013)	0	0	1	1	0	0
Bagley et al. (1994)	0	1	0	0	1	0
Bailey et al. (2016)	0	0	1	0	1	0
Baur et al. (2016)	0	0	1	1	1	0
Beier et al. (2009)	0	0	1	0	1	0
Briere & Runtz (1989)	0	1	0	0	1	0
Briere et al. (1992)	0	1	0	0	1	0
Briere et al. (1994)	0	0	1	0	0	0
Crépault & Couture (1980)	0	0	1	0	1	0
Dawson et al. (2016)	0	0	0	0	1	0
Dombert et al. (2016)	0	0	0	0	1	0
Freel (2003)	0	1	1	0	1	0
Fromuth & Conn (1997)	0	0	0	0	1	0
Hall et al. (1995)	0	0	0	0	1	0
Joyal et al. (2015)	0	0	1	0	1	0
Joyal & Carpentier (2017)	0	0	1	1	1	0
Mundy & Cioe (2019)	0	0	1	0	1	0
Santilla et al. (2015)	0	0	0	0	0	0
Schaefer et al. (2010)	0	0	1	0	1	0
Seto et al. (2015)	0	0	1	0	1	0
Smiljanich & Briere (1996)	0	0	1	0	0	0
Templeman & Stinnett (1991)	0	1	1	0	1	0

Williams et al. (2009)	0	0	0	0	1	0
Wilpert (2018)	0	0	1	0	1	0
Wurtele et al. (2014)	0	1	0	0	1	0

Direct Data Collection. All 27 studies collected their data directly from the participants, none used proxy therefore none scored at risk for this item.

Definition. Only six studies did not provide a clear definition of the studied phenomenon (e.g. SIIC, sexual attraction in children, sexual fantasies), only providing a description of the scale used to measure it (Bagley et al. 1994; Briere & Runts, 1989; Briere et al., 1992; Freel, 2003; Templeman & Stinnett, 1991; Wurtele et al., 2014).

Reliability/Validity. Over half of the studies (*n*= 16) did not provide information on the reliability and validity of the scales used to collect their data, often using questionnaires based on the criteria for paraphilia from the DSM manuals (e.g. Abdullahi et al., 2015) or using scales they developed themselves for the purpose of their study (e.g. Santtila et al., 2015).

Mode of Data Collection. Most of the study used the same mode of data collection for all participants (*n*= 24) apart from three studies. Alanko et al. (2013) and Baur et al. (2016) both used samples derived from the larger "Genetics of Sexuality and Aggression Study" (GSA) which collected data on two separate occasions, one in 2005 and one in 2006, with the latter using two methods of collection: the participants could answer an online questionnaire or be sent the questionnaire and return it by post. Joyal and Carpentier (2017) used two different methods of data collection; 500 participants answered a telephone survey and 543 participants completed an online questionnaire.

Length of Prevalence. The great majority of the studies (*n*= 23) did not provide a specific length of prevalence, either it was not mentioned, or they investigated the

phenomenon over the participants' lifetime. All four studies who provided a length of prevalence investigated the participants' SIIC in the past 12 months (Alanko et al., 2013; Briere, 1994; Santtila et al., 2015; Smiljanich & Briere, 1996). Studies using paedophilic disorder criteria from diagnostic manuals clarified that the sexual interest had to have lasted for a period of at least 6 months but did not provide a length for the prevalence rate (e.g. Abdullahi et al., 2015). Two studies provided a specific length for the prevalence of other variables but not the sexual interest of children (Bagley et al., 1994; Briere et al., 1992).

Numerator/Denominator. As most of the studies included in this review did not have a sample representative of the studied population, direct comparison with the general population could not be provided. Therefore, all studies accurately presented their findings (i.e. prevalence of SIIC), either by only providing the prevalence or by comparing prevalence between groups with the accurate use of numerator/denominator.

Overall Risk of Bias

Table 5 presents the overall ratings for risk of bias for the 27 studies included in this review. Based on the coding system suggested by Sun et al. (2019), only Santtila et al. (2015) rated as low risk of bias, scoring only at risk for not having a sample representative of the national population studied (item 1) and for not comparing the differences between respondents and non-respondents (item 4). It was also the only study to have excellent internal validity, scoring no (0) on all six items. For the remaining studies, 11 were found to have a moderate risk of bias, meaning studies replicating those studies would be likely to have an important impact on the confidence in the presented prevalence and may change that prevalence (Hoy et al., 2012). Over half the studies (*n*= 15) scored as being at high risk of bias, suggesting that if replicated it would be very likely that the prevalence rates presented would change.

Table 5

Overall risk of bias (Hoy et al., 2012)

Studies	Overall risk study bias
Abdullahi et al. (2015)	High risk
Ahlers et al. (2011)	Moderate risk
Alanko et al. (2013)	Moderate risk
Bagley et al. (1994)	Moderate risk
Bailey et al. (2016)	High risk
Baur et al. (2016)	High risk
Beier et al. (2009)	Moderate risk
Briere & Runtz (1989)	High risk
Briere et al. (1992)	High risk
Briere et al. (1994)	High risk
Crépault & Couture (1980)	High risk
Dawson et al. (2016)	Moderate risk
Dombert et al. (2016)	Moderate risk
Freel (2003)	High risk
Fromuth & Conn (1997)	High risk
Hall et al. (1995)	High risk
Joyal et al. (2015)	Moderate risk
Joyal & Carpentier (2017)	Moderate risk
Mundy & Cioe (2019)	High risk
Santilla et al. (2015)	Low risk
Schaefer et al. (2010)	Moderate risk
Seto et al. (2015)	Moderate risk
Smiljanich & Briere (1996)	High risk
Templeman & Stinnett (1991)	High risk
Williams et al. (2009)	High risk
Wilpert (2018)	High risk
Wurtele et al. (2014)	High risk

Discussion

Studies on prevalence of SIIC have indicated that it is not just present within clinical or forensic populations and have highlighted that mental health problems, ACEs and level of distress were also strongly associated with this sexual preference (Gerwinn et al., 2018; Stevens & Wood, 2019). The current systematic review aimed to enhance the scope of the search, considering multiple settings and definitions of the phenomenon, thus identifying 27

studies. Overall, the mean prevalence rates found varied between 2% and 6.8%, depending on the population and on the definition used to investigate it. Findings from this systematic review also suggest strong associations with mental health and personal difficulties in individuals who reported SIIC such as the presence of ACEs, depression, level of distress due to their sexual interest, as well as some associations with the presence of other paraphilic interests and antisocial attitudes.

This systematic review explored the primary research on the prevalence of individuals who reported having SIIC, as well as correlates, to identify methodological inconsistencies within the literature, including lack of consistency in the criteria used to define the phenomenon (e.g. diagnostic manual, age of the child), lack of representative samples and a variety of measures used to assess SIIC. Almost half of the studies (*n*= 12) however were over ten years old with a third (*n*= 9) dating prior to the year 2000. With the definition of paraphilic disorders in constant review and increased awareness in research in terms of risk of bias and methodological flaws, it is not surprising that this review found methodological discrepancies between the presented studies. Only one study (Santtila et al., 2015) however was considered as having low risk of bias as a prevalence study. Findings from this review warrant for more methodologically sound studies on individuals reporting SIIC.

Strengths and Weaknesses

Sample Characteristics

Prevalence studies on SIIC often have the conceptual problem related to the heterogeneity of the studied populations, often using samples comprised of men only (Fedoroff et al., 1999; Freel, 2003; Fromuth & Conn, 1997) or student samples. Within the current review only a third (*n*= 9) of the studies included women in their sample, one of which however was a sample comprised of women only (Fromuth & Conn, 1997), the remaining studies had samples comprised of men only. In addition, 12 studies recruited their

sample from university students which has likely influenced the average age of the studied samples. A total of 11 studies had a sample with a mean age under 30 years old. An overall mean age of 22.2 years suggests that participants were generally younger than the average age of the general public, as well as being predominantly male.

Apart from one study (Wilpert, 2018), all samples were non-clinical samples where participants were recruited within community or university settings, but two of those however recruited their samples from a larger sample of men who were defined as undetected offenders against children (Dunkelfeld) (Beier et al., 2009; Schaefer et al., 2010) and therefore its generalisability to the general public could be questioned. In addition, Bailey et al., (2016) used websites for adults already admitting being attracted to children to recruit their sample which might have skewed their prevalence rates of SIIC as they were much higher than for general population from the other studies included in this review.

Definition and Categorisation

Definition and categorisation are other relevant issues in the literature on SIIC. Eight studies out of 27 used specific criteria for paedophilia from diagnostic manuals (DSM-IV-TR, DSM-5 or ICD-10). Although more precise than using one's own definition, some argued that certain individuals who would self-report SIIC would not necessarily meet all criteria for paedophilia, such as experiencing a level of distress/interpersonal difficulties associated with it or being solely interested in pre-pubescent children. For instance, Ahlers et al. (2011) and Dombert et al. (2016) found a relatively small proportion of men reporting SIIC who experienced distress due to their sexual interest (5.3% and 0.6%, respectively), suggesting that the great majority of men who are sexually interested in children do not experience distress in relation to their sexual interest. In addition, several studies indicated that some men who reported having sexual interest in pre-pubescent children, also reported

sexual interest in pubescent children and/or adults (e.g. Bagley et al., 1994; Bailey et al., 2016; Beier et al., 2009; Santtila et al., 2015).

When non-diagnostic criteria were used to define SIIC and categorise the age of the children involved in the sexual preference, similar issues occurred. Some studies did not provide a specific age for the children, using terms such as pre-pubescent and pubescent children or young girl and young boy. In addition, the age of what was considered pre-pubescent and pubescent children also varied between studies. For instance, some studies divided pre-pubescent children between groups aged 0-6 years old and 7-12 years old, other studies included children up to 15 years old, others up to 16. As results from this review showed, the prevalence rates between what might be considered paedophilic interests compared to hebephilic interests varied greatly. Hence the importance of using a precise definition/categorisation if investigating the prevalence of SIIC. As mentioned at the start of this review, perhaps using a wider terminology such as paedohebephilia or minor-attracted persons would be more appropriate if looking at a global prevalence.

Another relevant issue to be considered in the literature on SIIC is how the sexual interest is measured. Again, by using diagnostic criteria this implied looking at sexual interests but also sexual fantasies, urges and behaviours. Not all studies investigated the phenomenon using all forms, some only focussing on fantasies and others on behaviours (i.e. sexual contact with children or use of CSEM). Findings from this review demonstrated significant inconsistencies in prevalence rates when comparing self-reported sexual interest to having sexual fantasies, with the latter reaching as much as 65% and 89.4% prevalence rates. However, these also varied on the sample's characteristics and when the study looked solely at sexual fantasies about children or the aim was to explore sexual fantasies in general. It is also possible to argue that participants might be more inclined to endorse sexual fantasies as opposed to admitting to sexual interest/attraction or behaviours.

Regarding the assessment of the sexual interest, some argued that an individuals' responses to sexual stimuli might involve cognitive, physiological, and behavioural elements (Spiering & Everaerd, 2007). They divided the cognitive elements of sexual interests into explicit (e.g. memories of sexual experiences, fantasies and attitudes about sex) and implicit cognitions (e.g. sexual urges and automatized sexual scripts) and argued that they then influence the physiological (e.g. physical arousal) and behavioural responses (e.g. engaging in sexual activities). Some suggested that a complete assessment of sexual interest should consist of the assessment of both implicit and explicit cognitions and physiological arousal (Babchishin et al., 2014). Most studies in this review only assess what would be considered explicit cognition elements, with only one study investigating physiological arousal by using phallometric measurement (Hall et al., 1995).

Sample Selection and Generalisability

Although all studies in this review were of a cross-sectional design and quantitative, with one study also using qualitative content, the varied sample selections have a common theme in that their external validity was considered either poor or acceptable, with only one study having good external validity (Joyal & Carpentier, 2017). Most studies were considered at risk of bias in terms of using samples representative of the targeted population, using simple random sampling and non-respondents bias. In regard to the latter, it is recommended to analyse potential differences between respondents and non-respondents to evaluate selection bias, but when information is not available, which was the case for most of the studies in this review, researchers should have compared the respondents' characteristics with the sociodemographic characteristics of the targeted population (Boyle, 1998; Martínez-Mesa et al., 2016). In this case, only five studies did evaluate the selection bias.

Despite generally large sample sizes across the studies examined, the use of men-only or student samples increased the likelihood of selection bias and reduced generalisability to

the general population. Student samples not only might have skewed the overall average age participants in this review, but some argued that generalising from a student sample to the general public can be problematic due to the student samples varying randomly from the general population samples, and this across and within countries (Hanel & Vione, 2016). Additionally, most of the research was conducted in North America (16 out of 27 studies), with the great majority in countries of European origin (26 out of 27) which may greatly influence their generalisability to other countries and cultures.

Finally, in regard to possible social desirability bias, due to the sensitivity of the information collected and certain collection methods used in the studies, some participants might not have provided an accurate answer to some of the questions on their sexuality. Research showed that face-to-face interviews as well as telephone interviews to collect data on individuals' sexuality might be embarrassing for participants, resulting in them concealing information or providing a more socially desirable picture of themselves (Gribble et al., 1999). These methods were used in five of the studies in this review. Although self-administered questionnaires are preferable to face-to-face interviews, they also come with their limitations such as the ability of the participants to read and understand the presented measures/instruments and still rely on the participants' honesty. In addition, in prevalence studies on sexuality, methodologists argued that a net negative bias is likely to occur. That is, a larger number of participants who deny engaging in the presented behaviour but who actually have engaged in, compared to the number of participants who report behaviours that they have not engaged in (Gribble et al., 1999).

Limitations

This review is not without its limitations. For reasons of quality control, the decision was made to include only peer reviewed published literature, thus meaning that grey literature and unpublished dissertation theses and research would be excluded. This suggests that

potential studies could have been omitted. Also, published articles might be at higher risk of reporting bias, in that statistically significant differences and prevalence rates are more likely to be reported than non-significant findings. In addition, by restricting the search criteria to studies published in English it potentially reduced the possibility of finding other studies with different cultural samples, resulting in limitations to the generalisability of this review. Finally, the decision to widen the search to different definitions and methods might have provided a larger sample and therefore a more accurate prevalence rate of the phenomenon, however due to the great discrepancies in definition used and categorisation in the studies, the generalisability of the presented prevalence is questionable. Perhaps the review should have focused solely on studies using specific definitions such as criteria for paedophilia in diagnostic manuals.

Implication for Future Research

Due to variability in definition and categorisation when describing SIIC, obtaining an estimated prevalence rate in the general population was challenging for the researchers. Researchers in this field should use a more precise definition of what they consider SIIC to be (e.g. fantasies, actual sexual contact, attraction) as well as what they consider pre-pubescent and pubescent children in terms of age. Even when using diagnostic criteria, research indicated that it would not include all potential individuals who would report having this sexual interest. Therefore, it is recommended for future research to provide a wider but precise definition as well as using more inclusive terminology such as minor-attracted individuals. In addition, as suggested by Babchishin et al. (2014), when exploring the prevalence of SIIC, the assessment should include measurement of explicit and implicit cognitions as well as physiological arousal for a better accuracy.

Findings from this review also indicated concerning prevalence rates of individuals' likelihood of engaging in criminal behaviours (e.g. sexual contact with children, viewing

CSEM) if they could avoid detection and of individuals who admitted already having engaged in these behaviours. Research indicated strong associations between SIIC and the use of CSEM (Seto & Eke, 2015) and with an increase in the number of arrests and convictions related to CSEM offences in the past decade (Wager et al., 2018), findings from this review warrant further research on the prevalence of SIIC to assess the potential risk that those individuals might pose by investigating further in use of CSEM or other CSE offences. Only 11 studies in this review looked at hypothetical (*n*= 4) or actual (*n*= 7) engagement in criminal behaviours involving children and only three looked at the prevalence of viewing (actual or hypothetically) CSEM online. By examining these variables, research could enhance the existent evidence base on risk factors associated with these offences.

Conclusion

Results from this review supported previous finding on SIIC in the general population in terms of prevalence rate and various correlates such as gender and difficulties experienced by those individuals. This review's findings indicate that research in the area was mainly undertaken in westernised countries, with only one study conducted in Africa. This might be due to this review's limitation to studies published in English only, but also to sociocultural factors. Customs and values vary from country to country as well as legal legislation, age of consent to sexual activities and definition of what consists of "normal" and "abnormal" sexual interests. Given the methodological difficulties associated with prevalence studies on sexuality in general, and even more so when investigating a topic as socially undesirable as SIIC, further research using recommended methodology to avoid biases should be conducted. The studies in this review also indicated possible links with self-reported SIIC and mental health issues and potential offending. Further research focussing on these associations is recommended as they could inform treatment, management and prevention programmes such as the German Prevention Project Dunkelfeld and Stop It Now in the UK (Beier et al., 2009;

Schaefer et al., 2010). This review aimed to provide a global prevalence rate of individuals who reported SIIC and their correlates. Despite some limitations and studies' methodological issues, this review gave a better understanding of the challenges faced by researchers when investigating the prevalence of a subject as sensitive as SIIC.

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THE UNIVERSITY
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Chapter Two

Predicting Risk of Reoffending in Child Sexual Exploitation Material Offenders: The use of Child Pornography Offender Risk Tool in a Scottish population[*]

Word count: 10,625 (excluding tables and reference list)

[*] This paper has been prepared according to the requirements of the journal of Sexual Abuse: Journal of Research and Treatment

Abstract

In the past decade, there has been an increase in child pornography offences and convictions. Although research shows that these offenders generally are at low risk of reoffending, certain factors do increase that risk. Law enforcement and criminal justice professionals are required to evaluate their level of risk to inform management, supervision and treatment in the community. The CPORT was created specifically for this offender population and has been found to show significant predictive validity for any recidivism and any sexual recidivism. This study aimed to validate the use of the CPORT in a Scottish sample of 144 male child pornography offenders. ROC and logistic regression analyses indicated that the CPORT significantly predicted any recidivism (AUC = .79), any sexual recidivism (AUC = .79) and child pornography recidivism (AUC = .75), suggesting that it is a valid risk assessment tool for Scottish offenders. Recommendations for future research and clinical implications are discussed.

Keywords: risk assessment, child pornography, child sexual exploitation material, validation study, CPORT

Introduction

Over the past two decades, the advances in information and communication technologies such as the easy availability of smart phones and social media platforms have had an impact on sexual offending. Developments such as the dark web and bitcoin increase access to and distribution of illegal material while making detection by law enforcement more difficult (Dalins, et al., 2018). As the technology evolves, not only does it increase the number of people, including children, who have access to the internet and potentially to illegal material, but it also provides new media for individuals to download, distribute and produce child sexual exploitation material online, for instance by harvesting self-generated images from the original uploaded location (e.g. child's social media page, blog, texts, emails) without the child's consent/knowledge and then transforming them into child sexual exploitation material (May-Chahal et al., 2018; Quayle & Cooper, 2015; Wager et al., 2018).

In addition, a recent rapid review by Wager et al. (2018) suggested that in both the US and the UK there have been increases in the numbers of arrests for possession of child sexual exploitation material, although this data relates to 2000-2009 and 2011-2015 respectively. In the US for instance, the number of arrests related to these offences more than doubled. Similar results were found in the UK regarding the number of obscene publication offences between 2010/11 and 2014/15, which were mostly attributed to an increase in the creation/making and distribution of indecent or pseudo-photographs of children and adults using internet and mobile technology. There has also been an 18% rise in the number of offenders convicted for possessing online child sexual exploitation material and a 35% increase in the number of offenders convicted of taking, making or distributing this type of material between 2006 and 2013 (Wager et al. 2018). In Scotland, the Scottish Government's report on recorded crime shows an annual increase of 8% in sexual crimes from 2017, its highest since 1971 (The Scottish Government, 2019). It was estimated that internet was used

as a method to perpetrate at least 20% of all sexual crimes recorded by law enforcement in Scotland in 2016/17 (The Scottish Government, 2018). These 'cyber-enabled' offences have seen an increase in the Scottish Governments' 'Other Sexual Crimes' category, going from 38% in 2013/14 to 51% in 2016/17 (The Scottish Government, 2018). This category has been on an upward trend since 2010-11, having increased by 226% within that time, including a 9% increase from 2017-18 to 2018-19 (The Scottish Government, 2019).

Terminology

Although the Luxembourg Terminology Guidelines uses the term "child sexual abuse material and child sexual exploitation material" to define these offences as opposed to child pornography or other known terminology, it recognises that child pornography is still widely used internationally and in supranational legislation, as well as in numerous studies (Greijer, et al., 2016). For the purpose of this study the term child pornography has been adopted to refer to online sexual exploitation of children in order to fit with the terminology used in the Child Pornography Offender Risk Tool (CPORT) validation study (Eke et al., 2018a).

Child Pornography Offenders' Risk of Reoffending

A recent study from Elliott et al. (2019) examined the reoffending rates of 584 child pornography-only (CP-only, 84.6%) and 106 mixed child pornography-contact (15.4%) offenders from a UK community intervention programme. After an average 13-year follow-up, proven reoffending rates were 24.8% for any reconviction and 12.6% for sexual reconvictions. However, the mixed group was more likely to receive any reconviction (mixed = 37.7%; CP-only =22.4%) and to receive a sexual reconviction (mixed = 26.4%; CP-only = 10.1%). Only 2.6% of the CP-only group was convicted of a subsequent sexual contact offence as opposed to 9.4% of the mixed group. When looking at a fixed 5-year follow up period, the ratios stayed relatively the same. The mixed group had a greater likelihood than CP-only offenders of any reconviction (mixed = 20.8%; CP-only = 12.5%) and any sexual

reconviction (mixed = 14.2%; CP-only = 2.7%) (Elliott et al., 2019). These results corroborate previous findings indicating that child pornography offenders have lower rates of reoffending (Eke et al., 2011; Endrass et al., 2009; Seto & Eke, 2015; Seto et al., 2011; Wakeling et al., 2011; Webb et al., 2007). Seto and Eke (2015) examined the rate of reoffending of child pornography offenders within a 5-year follow-up period. Of 266 adult male child pornography offenders, 11% were known to have committed a new sexual offence, 3% a new sexual offence against a child and 9% a new child pornography offence (Seto & Eke, 2015).

In an earlier meta-analysis, Seto et al. (2011) investigated the criminal history and reoffending rates of child pornography offenders. They found that 4.6% of child pornography offenders reoffended sexually. Of these 3.4% were child pornography offences and 2% were contact sexual offences (Seto et al., 2011). However, the samples included in their meta-analysis varied greatly in terms of size, time periods, sources used to collect the data and inclusion criteria. Some samples included both convicted offenders who attended a treatment programme and those who self-reported contact sexual offences.

Risk assessment tools for child pornography offenders

With an increase in access to the technology used to produce, view and distribute child pornography and an increase in child pornography convictions, law enforcement, criminal justice and mental health professionals are required to evaluate the risk of reoffending that these offenders might pose, particularly in terms of risk of contact offending, to improve case prioritisation and to inform management, supervision and intervention plans. The Risk Matrix 2000 (RM2000, Thornton et al., 2003) was one of the main risk assessment tools used to estimate the risk of reoffending of individuals convicted of sexual offences, including child pornography offenders (Barnett et al., 2010; Grubin, 2011; Hirschtritt et al., 2019; Wakeling et al., 2011). However, the RM2000 was not created to be used with child

pornography offenders and two of its items (i.e. stranger and noncontact) have to be omitted when used to look at risk level, bringing into question the use of this tool with child pornography offenders compared to other types of offenders (Barnett et al., 2010). Using the original version of the RM2000, it is impossible for an individual convicted of child pornography offences to score as low risk of reoffending on this risk assessment tool (Garrington et al., 2018). Elliott et al. (2019) in their study used the adapted version proposed by Barnett et al. (2010), the RM2000/S (without the stranger and noncontact variables) and found poor predictive validity for either any or sexual reconvictions with confidence interval for Area Under the Curve (AUC) values between .52–.64. They did find however that the RM2000/S obtained better results for the mixed group (child pornography and contact offending) as opposed to the child pornography-only group. A review of risk assessment tools used with child pornography offenders demonstrated that most actuarial tools designed to predict the risk of reoffending of sexual offenders overestimated their level of risk, rating them as moderate-high and high risk (Garrington et al., 2018). Nevertheless, a recent meta-analysis by Brankley et al. (2019) examined the predictive validity of the STABLE-2007 in offenders convicted of sexual offences, including child pornography offenders. They found that the STABLE-2007 significantly predicted any type of reoffending (i.e. sexual, violent-non sexual, violent-sexual and any crime) across all studies (Brankley et al., 2019). Although, only one study had a sample of child pornography offenders only, four other studies included this population in their samples and the results remained significant. These are promising findings regarding the use of the STABLE-2007, an actuarial tool looking at dynamic factors, in this population.

To date, two risk assessment tools have been developed specifically for use with this population. The Kent Internet Risk Assessment Tool- Version 2 (KIRAT-2; Long et al., 2016) and the Child Pornography Offender Risk Tool (CPORT; Seto & Eke, 2015). The

KIRAT-2 was developed to support police forces in prioritising their resources according to the level of risk (i.e. low or high) of contact offending that an individual suspected of child pornography offences might pose (Long et al., 2016). It allows police to prioritise investigations into the most dangerous offenders (i.e. those most likely to also have already committed contact sexual offences against children), however it does not purport to predict risk of reoffending (Garrington et al., 2018; Long et al., 2016). The Child Pornography Offender Risk Tool's (CPORT) (Seto & Eke, 2015) original aim was to support relevant authorities in the prioritisation of cases by providing information relevant to case management, supervision and prioritisation of treatment goals (Eke et al., 2018a), but was found to be a useful structured risk checklist to predict any recidivism and any sexual recidivism among adult male offenders with a conviction for child pornography offences. Although these two tools were specifically developed to be used with child pornography offenders, they both had relatively small samples, used official records only and required access to the content of the child pornography material itself in order to score some of their items; information which might be difficult to access by criminal justice and mental health professionals (Hirschtritt et al., 2019). Despite these limitations, the CPORT remains the only tool developed especially to predict the risk of reoffending of child pornography offenders and is still preferred to unstructured risk judgement (Elliott et al., 2019).

Child Pornography Offender Risk Tool (CPORT) Validation Studies

The CPORT was developed from an existing dataset comprised of variables from 286 Canadian child pornography offenders with a fixed 5-year follow-up period. Based on previous studies on correlates of recidivism in child pornography offender populations, the authors looked at specific information such as previous criminal history, age at index offence (IO) and gender of the child(-ren) in the child pornography material, consistent with findings from previous studies looking at the risk of reoffending in this population. They identified the

seven following risk factors: (1) age at time of index investigation; (2) criminal history; (3) failure on conditional release; (4) contact sexual offence; (5) indication of paedophilic/hebephilic interest; (6) ratio of boy to girl content in child pornography material and (7) ratio of boy to girl content in other material. In the present study these items were coded according to the authors' scoring guidance (Eke et al., 2018b).

The authors used Receiver Operating Characteristic (ROC) to evaluate its level of accuracy in predicting recidivism in child pornography offender populations. Their sample included offenders who had no history of contact sexual offences and mixed offenders (criminal history and contact sexual offending). Their recidivism information was collected through official records and included any new offences committed after the index offence, including while awaiting trial, which led to criminal charges. They excluded new charges for historical offences (Eke et al., 2018b). In the development study, they looked at the CPORT's predictive validity for any recidivism (AUC =.66, 95% confidence interval [.59, .73]), but in their validation study they focused only on any sexual recidivism, including contact sexual and child pornography recidivism. Overall, the CPORT significantly predicted any sexual recidivism for all offenders in the sample, Area Under the Curve (AUC) = .74, 95% confidence interval (CI) [.63, .84], as well as child pornography recidivism with an AUC = .76, 95% CI [.65, .88] (Seto et al., 2015). However, its predictive validity for any sexual recidivism was not significant for those without a contact sexual offence history (AUC = .69, 95% CI [.54, .83], but did significantly predict any sexual recidivism for mixed offenders (AUC = .80, 95% CI [.63, .96]) (Seto & Eke, 2015).

CPORT was also tested in Pilon's (2016) thesis which looked at the predictive validity of the CPORT and the Level of Service Inventory- Ontario Revision. However, in Pilon's study the dataset used had limited information on certain variables including the content of the seized child pornography material. Therefore, the following modifications

were made on the CPORT items in order to conduct the study: age based on remand or sentence start date (rather than age at time of investigation), prior history based on convictions (not charges), indication of sexual interest in children based on luring or sexual interference involving youth, and omitting the two child content items (i.e. items 6 and 7). In addition, the author used a 3-year follow-up period rather than the 5-year follow-up used in the development study (Eke et al., 2018a; Pilon, 2016). With an initial Canadian sample of 279 child pornography offenders, the modified CPORT total score showed a moderate predictive accuracy of any criminal recidivism (AUC = .680, 95% CI[.56, .81]), but did not significantly predict sexual recidivism (AUC = .56, 95% CI [.32, .79]) (Pilon, 2016). The CPORT's authors suggested that this result might be explained by the low base rate of any sexual recidivism in the validation sample (2.9%) in the follow-up, differences in coding sexual interest in children, and the missing child content items, which they argued would be of significant relevance in predicting sexual offences as opposed to nonsexual offences (Eke et al., 2018a).

Recently, a validation study was conducted combining the development study's sample (n= 266) with a new validation sample (n= 80). Both samples were collected using Canadian police services data but did not overlap. The validation sample significantly differed in regard to the method of detection of the offence by the police and also none of the individuals in the validation sample had previous child pornography charges compared to the development sample which had 17 (6%) individuals who had prior child pornography offences. Despite this, the samples were very similar in terms of demographic variables and the types of offences involved. In order to increase statistical power, they combined the two samples and formed a final combined sample of 346 Canadian offenders meeting the study's inclusion criteria (described in the section below: Eke et al., 2018a). Analyses were conducted to test differences between the AUCs between the two samples for both sexual and

child pornography recidivism and found no significant differences in predictive accuracy (Eke et al., 2018a). Despite its small sample size, findings from the validation sample were consistent with the development sample and within expected sampling error. The authors also used the Correlates of Admission of Sexual Interest in Children (CASIC) in 25 cases (7%) where CPORT item 5's information was missing. The CASIC was developed by Seto and Eke (2017) to be used as a potential substitute to the CPORT item 5, i.e. indication of paedophilic interests, after realising this item was the most common missing item and that self-report lacked corroboration (Eke et al., 2018a). The CASIC's items correlate with CPORT item 5 and are comprised of the following six items: (1) never married; (2) child pornography content included videos; (3) child pornography content included sex stories involving children; (4) evidence of interest in child pornography spanned 2 or more years; (5) volunteered in a role with high access to children; and (6) engaged in online sexual communication with a minor or officer posing as a minor.

In the combined sample, results from ROC analyses indicated that all CPORT items and total scores that significantly predicted any sexual and specifically child pornography recidivism, except for item 1 (below 35 years at the time of the index investigation) which obtained an effect size of .57. The authors argued that this effect size could still be considered meaningful in magnitude. The total CPORT score obtained large effect sizes with and without missing information (AUC = .72-.74 and AUC= .75-.77, respectively). The authors also divided the sample between child pornography offenders only (i.e. Child Pornography/No Contact = CP/NC) and child pornography offenders with contact offences (Child Pornography + Contact offences = CP+C). They repeated the analyses within the subsamples and found that the effect sizes were higher for the CP+C for nine of the 12 performed analyses with the CPORT total score obtaining a large effect size of .72 for the CP+C group compared to .66 for the CP/NC group (Eke et al., 2018a).

In addition, logistic regressions were performed to provide recidivism estimates for the CPORT scores. The analyses were conducted for the combined sample, for the validation and development samples separately and by offender types. A total of 18 analyses were performed with odd ratios ranging from 1.24 to 3.85, with a median odds ratio of 1.75, suggesting that on average for each point increase on the CPORT the odds of recidivism increases by approximately 75% (Eke et al., 2018a). When looking at the validation sample only, the predicted sexual recidivism rates by score were around 50% higher than the development sample. However, due to the small sample size (*n*= 73, only 12 recidivists) the authors suggested that the result should be considered unstable and despite obtaining similar results when combining the samples, they recommended further validation studies before using those estimates for applied risk assessments. In terms of child pornography recidivism, similar recommendations were suggested due again to low rates of recidivism (*n*= 7 in validation sample; *n*= 29 in combined sample) which is considered insufficient for stable recidivism estimates (Eke et al., 2018a).

As to the differences between types of offenders, it was found that the CP+C group's overall recidivism rates were almost three times higher than the CP/NC group as well as having higher average CPORT scores (approximately 1.5 SD higher). In terms of sexual recidivism, the logistic regressions found that the CP+C group's rates for each CPORT score were approximately 30% higher than in the CP/NC group. Findings suggest that recidivism rates for child pornography were fairly similar for both groups, but it was noted that CP+C offenders obtained higher recidivism rates for the highest scores on the CPORT (Eke et al., 2018a).

Overall, with the combined sample (*n*= 346) and a 5-year fixed follow-up period, results showed that the CPORT could significantly predict any sexual recidivism as well as child pornography (i.e. child pornography) recidivism.

Present Study

Given that it was developed and validated in Canada (Eke et al., 2018a; Seto & Eke, 2017), it is not currently possible to suggest that the CPORT would be an accurate tool to use in predicting the risk of recidivism within Non-Canadian populations. In addition, due to the small sample size of their validation study and as suggested by the authors, further studies should be conducted in order to validate their findings using larger samples. The aim of the present study is to replicate the Eke et al. (2018) study to investigate the CPORT predictive validity in a Scottish sample of child pornography offenders.

Scottish Context

In Scotland, child pornography offenders are sentenced under section 52 of the Civic Government Scotland Act 1982. There are three main behaviours: 1) possession, which means that child sexual abuse material is recovered on the individual's device, including thumbnail format and deleted browser history (image not recovered, but viewed online); 2) create/make, which could involve taking indecent images of children through grooming or contact offending, but also includes behaviours which do not involve contact offending such as downloading images and moving them to another location (i.e. re-creating the images), ; 3) distribution, which means sharing child sexual exploitation material with other individuals but also includes moving images from one device to an external drive for instance.

Method

Sample

Permission to access information was obtained from, and with the collaboration of, Police Scotland. In addition, ethical approval for this study was obtained from the University Research Ethics Committee (see Appendix C). Police Scotland provided anonymised data which was extracted from the Police systems and was limited to offenders located on the east coast of Scotland. A total of 176 cases of individuals convicted of child pornography offences

were provided. In order to replicate the original CPORT validation study (Eke et al., 2018a), all cases had to meet the three following selection criteria to be eligible for inclusion: a) the convicted offenders had to be male and aged 18 or older; b) they had to have a conviction of child pornography as their index offence (IO) or as a charge in their IO; c) their release date or community sentence had to be prior April 2014 to allow a fixed 5-year follow up based on the latter criterion, 32 cases were excluded from the sample. Consequently, the sample comprised of 144 cases. The conviction dates for those cases ranged between February 2010 and December 2013.

Almost 64% of the sample (*n*= 92) lived in an urban area, leaving 36% (*n*= 52) who lived in rural areas. At the time of data collection (after the 5-year follow up period) most of the offenders were living in the community being compliant with their orders (*n*= 59, 41%) or being monitored by Criminal Justice Social Workers (*n*= 16, 11.1%). Three (2.1%) were deceased, three (2.1%) in custody and for 63 (43.8%) of the cases the information on their current status was not provided. A total of 109 (75.7%) were rated as being at low risk of reoffending by the criminal justice system, 31 (21.5%) medium risk and three (2.1%) were considered high risk; one case was not rated (0.7%). The majority of the sample (*n*= 102, 70.8%) came to the attention of the police through police enquiry into their online activity, whereas 38 (26.4%) were detected through concerns from members of the public (e.g. disclosed chatroom content or found child pornography material and contacted the police), one (0.7%) through an anonymous call, and three (2.1%) through self-disclosure.

Like Eke et al.'s (2018) sample, the child pornography material seized included images and videos that offenders accessed by using the internet (online) but also material that was considered offline such as DVDs or hard copies of images which they could have made themselves or purchased, however information about the provenance of the offline material was not provided. Over 85% of the sample (*n*= 125) committed their child pornography

offences using online technologies only, 11 (7.6%) used both online and offline material (including DVDs) and eight (5.6%) used offline material only. The format of the material varied between images and videos (*n*= 78, 54.2%), images only (*n*= 58, 40.3%), videos only (*n*= 6, 4.2%), images, videos and chatlogs (*n* = 1, 0.7%) and images and cartoon videos (*n* = 1, 0.7%).

Like the validation sample from Eke et al. (2018), the majority of the sample had possession convictions (60.5%, *n* = 87), over half had convictions of taking (making) or permit to take (make) child pornography (54.9% *n* = 79) and 13.3% (*n* = 19) had distribution convictions. It is important to note that in Scotland taking (making) or permit to take (make) child pornography convictions do not necessarily mean the production of first-generation images (likely to involve contact offending) as explained earlier in this paper. In the current sample (*n*= 144), no individual had convictions or charges of sexual contact offending as part of their index offence, therefore it is possible to conclude that all convictions of taking (making) or permit to take (make) child pornography in this sample did not involve direct contact offending. In addition, several individuals had more than one child pornography conviction (e.g. possession and distribution): 41.7% (n = 60) had possession convictions only; 33.3% (n = 48) had only taking or permit to take (make) convictions; 11.8% (n = 17) had convictions of possession and taking or permit to take (make); 5.6% (n = 8) had taking or permit to take (make) and distribution convictions; 4.2% (n =6) had convictions including the three offences; and only one individual (0.7%) had a conviction of distribution only.

A total of 24 offenders (16.7%) had previous criminal histories, from which four (2.8%) had a previous convictions for child pornography offences, 13 (9%) had previous convictions for contact sexual offences and 14 (9.7%) had nonsexual criminal convictions including theft, assault, fire raising, possession of a weapon and drug offences. The majority of the sample (*n*= 99, 68.8%) had a child pornography offence as their primary index offence

(IO), the remaining 45 (31.2%) had child pornography charges included in their IO. Similar to Eke et al.'s (2018) study, the majority of the sample's IO were comprised of noncontact sexual offences only (*n*= 123, 85.4%), with 21 (14.6%) offenders having a combination of child pornography and contact sexual offences. To replicate Eke et al.'s (2018) study, these two groups were defined as Child Pornography/Non-Contact group (CP/NC, *n*= 123) and the dual group as Child Pornography + Contact (CP+C; *n*= 21).

Measure

Child Pornography Offender Risk Tool (CPORT)

The frequencies for the CPORT items for this study's sample are presented in Table 6. One case did not have information on previous criminal history (item 2) as police records were deleted after the person had died. 18 (12.5%) cases could not provide an accurate answer to CPORT item 6 due to the seized material depicting what appeared to be an equal amount of girl and boy content. Those cases were coded as absent (i.e. did not have more boy than girl content). A large number of cases (*n*= 121; 84%) did not have the recorded information to code CPORT item 7 and in 1 case item 6 was not recorded. These "missing data" could be explained by the following reasons. It is possible that the majority of individuals in this sample did not possess any "other material" or that due to the legal status of the "other material" (e.g. children in swimming suits) it might not be regular practice to record this type of information in Scotland unless having specific reasons to do so. Unfortunately, due to the binary format used to code CPORT items (i.e. absence or presence of the risk factor), CPORT item 7 could not be coded as absent as this would suggest that the material did not have more boy than girl content as opposed to the information being simply unavailable. Consequently, these 121 cases had to be coded as missing information to avoid any confusion. In addition, in 10 cases CPORT item 5 was reported by police data as "no admission" without any mention of denying sexual interest in children. These cases were

coded as absent but use of the CASIC was considered for further evaluation. The mean total CPORT score for the whole sample, regardless of missing data, was 1.75 (SD= 1.38, range 0-6). When excluding item 7 from the analysis, the mean CPORT total score was 1.69 (SD= 1.29, range 0-5).

Table 6

Frequencies of the presence of risk factors for the seven CPORT items (n= 144)

CPORT item considered as higher risk	*n*	%	*n* missing	%
1- 35 years old or younger at time of index investigation	72	50	0	0
2- Presence of previous criminal history	37	25.7	1	0.7
3- Any failure (previous or IO) on conditional release/bail	28	19.4	0	0
4- Presence of contact sexual offending (previous or IO)	21	14.6	0	0
5- Presence of indication of paedophilic/hebephilic interest	62	43.1	10	6.9
6- More boy than girl content in child pornography material	23	16	1	0.7
7- More boy than girl content in other material	9	6.3	121	84

Correlates of Admission of Sexual Interest in Children (CASIC)

Although only 10 cases (6.9%) benefited from using the CASIC to substitute CPORT item 5, the CASIC items were scored for the whole sample as, according to the authors' guidelines, a score of 3 or higher on the CASIC implies that CPORT item 5 should be coded as present (Eke et al., 2018b). This substitution has been used only on specific cases in this study and is discussed further in the Results section. It is important to note that none of the cases reported presence of sex stories involving children (CASIC item 3). The mean total CASIC score for the whole sample, regardless of missing data, was 2.08 (SD=0.95, range 0-5).

Table 7

Frequencies for the six CASIC items (n= 144)

CASIC item considered as higher risk	*n*	%	*n* missing	%

1- Never married	81	56.3	0	0
2- Child pornography material included videos	86	59.7	0	0
3- Child pornography material included sex stories involving children	0	0	0	0
4- 2 years or more interest in child pornography material	111	77.1	14	9.7
5- Volunteered in a role with high access to children	5	3.5	1	0.7
6- Engaged in online sexual communication with minor	16	11.1	1	0.7

Procedure

The lead investigator did not have direct access to police records and reports. The anonymised information was provided by Police Scotland. It contained the available information related to the child pornography offences and demographic data on the offenders such as marital status and date of conviction. The information provided was already formatted in accordance with the CPORT and CASIC items, which meant that some of the variables were already coded as present or absent (or missing) and did not provide further information. Therefore, completion of all items, including the content items (i.e. CPORT 6 and 7) were dependent on the available information. The information was then reorganised, manipulated and coded by the lead investigator.

To be consistent with the original CPORT validation study (Eke et al., 2018a), the information collected was divided into the following domains: (a) offender demographics (age at index investigation and conviction, marital status, education, occupation), (b) index charges and convictions, (c) criminal history (number and type of prior charges and convictions), (d) CPORT items, (e) CASIC items, (f) collection details (e.g., type and format of material), and (g) child pornography material collecting behaviour (e.g., length of time collecting).

Follow-Up Period and Recidivism Coding

In regard to the calculation of the follow-up period, the procedure replicated the CPORT development study and the validation study (Eke et al., 2018a; Seto & Eke, 2015), namely calculating the difference between the date of first release (e.g. bail, at conviction or after custody) from the index child pornography charge(s) and the date when data collection was performed, which in this study was spring 2019. In line with the validation study, time in custody (when applicable) was deducted so the follow-up period was comprised of time spent in the community where the individual had an opportunity to reoffend. To replicate the validation study, the follow-up period was fixed to 5 years following release into the community; 144 of 176 cases met that criterion (M = 6.5 years, SD = 0.99 year; range = 5.00-9.08 years). Of those cases, 82 (56.9%) obtained sentences to serve in the community such as Community Payback Order, 57 (39.6%) had custodial sentences and five (3.5%) were admonished which in Scotland means that the offender is given a warning, without any other form of punishment, but that the offence is still recorded on a criminal record.

Following Eke et al. (2018), recidivism was coded as present if the individual was convicted of a new offence within the 5-year follow-up period, discarding any new offences committed after that period. In addition, a second researcher who was blind to the original data coding chose 32 random cases (18% of the whole sample; *n*= 176) and coded the follow-up time and recidivism data as well as the CPORT and CASIC scores.

Interrater Reliability

To assess interrater reliability of the variables mentioned above, intraclass correlation coefficient (ICC) and kappa coefficient were used on the 32 randomly chosen cases. Any disagreements in coding were settled using the consensus method where the two coders agreed to the same coding. ICC was used to look at the interrater reliability of the fixed 5-year follow up period variable and kappa coefficients were used on the categorical variables

(i.e. CPORT items and total score, CASIC items and total score and recidivism). To interpret the ICC, this study used the guidelines provided by Cicchetti (1994) to report varying levels of agreement using the following range of values: .40 as fair agreement, .60 as good agreement, and .75 as excellent agreement (Cicchetti, 1994). The IIC for the fixed 5-year follow up variable was .988. For the categorical variables, the following guidelines were used with range of values for level of agreement: 'Almost Perfect'= .81 – 1.00; 'Substantial'= .61 - .80; 'Moderate'= .41 - .60; 'Fair'= .21 - .40; and 'Slight'= .00 - .20 (Landis & Koch, 1977). Kappa coefficients for the CPORT individual items were between .64 and .91, with the exception of CPORT item 6 obtaining a kappa coefficient of .54. The later could be explained by one of the raters scoring items where the material had an equal amount of boy and girl content as missing data, scoring them 9 rather than 0 for absent, which increased the discrepancies between the scores. This was resolved and agreed by both raters. Similar results were obtained when rating the CASIC individual items with kappas ranging from .65 to 1.00. As to the total score on the CPORT and the CASIC, the raters obtained moderate (k= .53) and substantial (k= .74) agreement respectively. The moderate agreement for the CPORT could be explained by the discrepancies for CPORT item 6. Finally, the level of recidivism obtained a kappa coefficient of .78, suggesting a substantial agreement.

Overview of Analyses

Prior to conducting the study, power analyses were performed to provide an estimate of the minimum sample size required to obtain a medium effect size. The initial estimate was computed via G*Power (Faul et al.,2009), an online statistical calculator. The calculation included seven predictor variables (i.e. CPORT items), an alpha level of 0.05 (Cohen, 1992), and statistical power of 0.8 (Faul et al., 2009). In addition, a two-tailed approach was adopted to reduce the likelihood of a type II error. The calculation output indicated that a minimum sample size of 103 would be required for the study to be adequately powered. In terms of

sample size when using receiver operating characteristic (ROC) analysis, another online calculator called MedCalc (MedCalc Software, 2017) was used. Again, the statistical power was 0.8, an alpha of 0.05 and an area under the curve (AUC) of .639 for a medium effect size (Rice & Harris, 2005), were used for calculation. The calculation output suggested that a minimum sample size ranging between 78-90.

According to Singh (2013), when investigating the predictive validity of a risk assessment tool two main components should be analysed: calibration and discrimination; practice also recommended by the RADGEE statement (Singh et al., 2015) when reporting predictive validity of risk assessment tools. Therefore, as well as presenting the relative predictive accuracy (i.e. discrimination) of the CPORT and its predicted recidivism rates, other indicators of predictive validity are presented in this study, namely Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV), capturing the tool's calibration (Singh, 2013).

As the aim of this study was to explore the validity of the CPORT by replicating its original validation study, the same analyses were performed. The Area Under the Curve (AUC) from Receiver Operating Characteristic (ROC) analyses were therefore used to assess the relative predictive accuracy of the CPORT items and total scores. The use of the AUC values is the preferred measure of predictive or diagnostic accuracy over the Cohen's *d* and the Pearson's *r* (Rice & Harris, 2005). It ranges between 0 and 1, with a score nearer 1 suggesting better positive predictive accuracy. AUCs of .56, .64, and .71 were considered small, moderate, and large effect sizes, respectively (Rice & Harris, 2005).

To examine the predicted recidivism rates for CPORT scores, logistic regressions were conducted. These analyses compared the estimated rates of any recidivism, any sexual recidivism and child pornography recidivism to the observed rates of recidivism. To examine any potential differences between observed and estimated rates of recidivism, analyses were

performed on the whole sample but also on the two offence type groups (i.e. CP/NC and CP+C).

The Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) measures were calculated using the formulas presented in Singh (2013). The Sensitivity and Specificity were calculated by using a 2x2 contingency table dividing the outcomes into four categories: True Positives (TPs; individual considered to be at high risk and who reoffended), False Positives (FPs; individuals considered to be at high risk but who did not reoffend), True Negatives (TNs; individuals considered to be at low risk and who did not reoffend) and False Negatives (FNs; individuals considered at low risk who did reoffend). By using these categories, it was possible to obtain the Sensitivity (TP/(TP+FN)), the proportion of individuals who committed criminal offences and were considered to be at high risk, and Specificity (TN/(TN+FP)), the proportion of individuals who did not engage in criminal offences and were judged to be at low risk (Singh, 2013). Similarly, by using these categories it was possible to calculate the PPV (TP/(TP+FP)), the percentage of individuals who were considered to be at high risk and who did go on to reoffend, and NPV (TN/(TN+FN)), the percentage of individuals who were considered to be at low risk and did not reoffend (Singh, 2013). All analyses were performed using Statistical Package for the Social Sciences-24 version (SPSS-24; IBM Corp., 2016) and the MedCalc (MedCalc Software, 2017).

Results

Recidivism Rates

A total of 35 (24.3%, *n*= 144) individuals were charged, or convicted of, another criminal offence within the fixed 5-year follow up period. Of those, 14 (9.7%) committed another sexual offence. Eleven (7.6%) of those sexual offences were another child pornography offence, with one of them also including an offence related to breaching licence

conditions and possession of a weapon. One individual was reconvicted for a contact sexual offence (0.7%), as well as assaults and breach of Sexual Offences Prevention Order (SOPO), which is considered a sexual conviction in Scotland. That individual had a previous history of contact sexual offending. Two other individuals (1.4%) from the sexual recidivists were reconvicted due to breaching their SOPO, one of whom also had stalking charges. Of the remaining 21 recidivists, 13 (9%) were charged or reconvicted for offences in relation to breach of bail/licence conditions, two for drug related offences (1.4%), two for dangerous driving offences (1.4%), one for threatening/harassing behaviour (0.7%), one for breach of conditions and communication act offences (0.7%), one for breach of conditions, threatening behaviour and weapon possession (0.7%) and one for theft (0.7%). Table 8 presents the rates of any recidivism, sexual and child pornography recidivism for all offenders and for the offender type (i.e. CP/NC and CP+C). The recidivism rates for any sexual recidivism significantly differ between the two groups ($\chi^2(1) = 5.559$, $N = 144$, $p = .034$) but unlike the validation study, the recidivism rates between the offender types did not differ significantly for any recidivism ($\chi^2(1) = 2.541$, $N = 144$, $p = .097$)) or for child pornography recidivism ($\chi^2(1) = 1.540$, $N = 144$, $p = .203$).

Table 8

Fixed 5-year recidivism rates

		Any recidivism		Any Sexual recidivism		CP recidivism	
Group	*n*	*n*	%	*n*	%	*n*	%
All offenders	144	35	24.3	14	9.7	11	7.6
CP/NC	123	27	21.9 (18.8)	9	7.32 (6.3)	8	6.5 (5.6)
CP+C	21	8	38.1 (5.6)	5	23.8 (3.5)	3	14.3 (2.1)

Note. CP = Child Pornography; CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders. Percentages are presented based on the sub-sample size. Percentages in brackets are based on whole sample ($n = 144$).

Difference in CPORT Scores Between Offender Types

In order to examine the difference between offender type on the CPORT scores, the mean score of the CP/NC sample was compared with that from the CP+C sample. Due to the number of cases coded as missing information on CPORT item 7, the analyses could not be performed on a sample with no missing information due to low statistical power, thus they were conducted using cases with only one missing CPORT item (n =142). Results show a significant difference ($p < 0.001$) between the two groups (table 9) and suggest that CP + C offenders scored 1.8 SD higher than the CP/NC group on the CPORT. As explained by Eke et al. (2018a) in their study, this difference could be explained by all CP+C having an additional risk point for contact sex offences (i.e. CPORT item 4). In addition, similar to Eke et al. (2018a), when looking at the percentage per sub-sample, CP+C offenders in this study were more likely to have an additional risk point on prior criminal history item (i.e. CPORT item 2; n = 12, 57%) than CP/NC offenders (n = 25, 21%).

Table 9

Fixed 5-Year Follow-Up: Differences in CPORT Scores Based on Offender Type

	CP/NC offenders			CP+C offenders			Effect size	
	n	M	SD	*n*	M	SD	*d*	95% CI
Only one missing CPORT item	121	1.50	1.21	21	3.29	1.30	1.78	[1.21, 2.36]

Note. The CPORT scores include only cases with one missing item. CASIC substitutions for CPORT item 5 were not included in the scoring of CPORT. CPORT = Child Pornography Offender Risk Tool; CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders; CI = confidence interval; CASIC = Correlates of Admission of Sexual Interest in Children.

Relative Predictive Accuracy of CPORT Items and Scores

The CPORT total scores predictive accuracy for any recidivism and any sexual and child pornography recidivism are presented in table 10. The results were also divided by offender type. When looking at the whole sample (with missing information), the CPORT total score obtained a large effect size in predicting all types of recidivism: any recidivism,

AUC = .78; sexual recidivism, AUC = .79; child pornography recidivism, AUC =.75. To replicate the validation study, the analyses were also conducted using the cases without any missing information but also on a sample of cases with only one missing CPORT item. According to the CPORT scoring guide, the authors examined the possibility of omitting CPORT items 5 and 7 due to the assumption that the information on these items (i.e. admission/diagnosis of sexual interest in children; content of images of children other than child pornography) is more likely to be missing in clinical and criminal justice records (Eke et al., 2018b). They found that, by using this compact version, the predictive accuracy of CPORT total score obtained large effect sizes (AUCs = .73, 95% CI [.63, .83]) despite omitting two items (Eke et al., 2018b). In addition, in their development sample, they performed the analyses on cases with only one missing item and obtained similar results (any sexual recidivism, AUC =.74, 95% CI [.63, .84]; child pornography recidivism, AUC = .76, 95% CI [.64, .88]). Although their findings support the use of the CPORT when items are missing, the authors stressed the need for further research to support those findings and therefore advised not using the CPORT if more than one item is missing (Eke et al., 2018b). Therefore, the present sample comprises cases with only one missing item on the CPORT. However, analyses were also performed omitting CPORT items 5 and 7 to test the compact version. When using cases where only one item was missing, results show significant large effect sizes for the predictive accuracy of any recidivism (AUC = .79), any sexual (AUC = .79) and child pornography recidivism (AUC = .75). Similar results were found when using the compact version (i.e. omitting items 5 and 7) with an AUC = .82 for any recidivism, AUC = .80 for any sexual recidivism and AUC = .77 for child pornography recidivism. As a large amount of cases were coded as missing CPORT item 7, the analysis had insufficient power to detect a small effect size and was not significant.

Table 10

Predictive Accuracy (5-Year Follow-Up) of CPORT Total Scores—Any Recidivism, Any Sexual Recidivism or Any Child Pornography Recidivism

	All offenders			CP/NC offenders			CP + C offenders		
	n	AUC	95% CI	*n*	AUC	95% CI	*n*	AUC	95% CI
CPORT total (all cases)									
Any recidivism	144	**.788**	[0.708, 0.868]	123	**.792**	[0.703, 0.881]	21	.556	[0.763, 0.910]
Any sexual recidivism	144	**.794**	[0.698, 0.890]	123	**.789**	[0.670, 0.909]	21	.688	[0.459, 0.916]
Child pornography recidivism	144	**.754**	[0.642, 0.866]	123	**.773**	[0.643, 0.904]	21	.625	[0.368, 0.882]
CPORT (one missing CPORT item)									
Any recidivism	142	**.785**	[0.704, 0.865]	121	**.789**	[0.699, 0.879]	21	.556	[0.201, 0.910]
Any sexual recidivism	142	**.791**	[0.694, 0.888]	121	**.786**	[0.665, 0.907]	21	.688	[0.459, 0.916]
Child pornography recidivism	142	**.751**	[0.638, 0.863]	121	**.770**	[0.638, 0.902]	21	.625	[0.368, 0.882]
CPORT (no missing information)									
Any recidivism	21	.728	[0.492, 0.963]	12	.719	[0.408, 1.000]	9	.938	[0.757, 1.000]
Any sexual recidivism	21	.631	[0.378, 0.884]	12	.556	[0.220, 0.891]	9	.786	[0.448, 1.000]
Child pornography recidivism	21	.596	[0.310, 0.881]	12	.556	[0.220, 0.891]	9	.786	[0.448, 1.000]
CPORT (compact version)									
Any recidivism	144	**.816**	[0.738, 0.894]	123	**.818**	[0.731, 0.905]	21	.546	[0.198, 0.894]
Any sexual recidivism	144	**.803**	[0.710, 0.896]	123	**.802**	[0.691, 0.912]	21	**.788**	[0.592, 0.985]
Child pornography recidivism	144	**.766**	[0.659, 0.873]	123	**.795**	[0.673, 0.916]	21	.681	[0.417, 0.945]

Note. CASIC substitutions for CPORT Item 5 were not included in the scoring of the CPORT. Compact version = omitting CPORT items 5 and 7. CPORT = Child Pornography Offender Risk Tool; CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders; AUC = area under the curve; CI = confidence interval; CASIC = Correlates of Admission of Sexual Interest in Children. An AUC value is significantly different from chance and is bolded when the 95% CI does not include 0.5.

Offender Type Sub-samples

The ROC analyses were performed on both offence type sub-samples. It is important to note that regarding information coded as missing (i.e. CPORT item 7), the distribution of the missing information differed significantly between the two groups. The great majority of the CP/NC sample (90.2%, *n* = 111) had no available information for CPORT item 7 compared to 47.6% (*n* = 10) of the CP + C sample. Contrary to Eke et al. (2018a), when separating the analyses by offender type, AUCs for CPORT total scores (with, without missing information and compact version) were higher and only significant for the CP/NC sample compared with the CP + C sample. Including all cases (with missing information), AUCs for CPORT total scores were between .77 and .79 for CP/NC offenders compared with .56 and .68 (non-significant) for CP + C offenders for all types of recidivism.

The only exception was a significant AUC of .79 for CP+C offenders for any sexual recidivism when using the compact version (i.e. omitting CPORT items 5 and 7). Like the validation study, confidence intervals for the CP + C sample varied largely, which was likely due to its small sample size.

CPORT Items' Predictive Accuracy

ROC analyses were conducted on each individual CPORT item across all samples to explore their predictive validity. Only two items significantly predicted any recidivism and any sexual and child pornography recidivism with moderate to large effect sizes; previous criminal history (AUCs between .66 and .75) and any history of breach (e.g. bail or conditions) (AUCs between .74 and .83). The remaining CPORT items were not significant predictors of recidivism and their AUCs varied between .37 and .62 , considered small effect sizes. When using cases where only one item was missing similar results were obtained, with CPORT items 2 and 3 being the only significant results and AUCs varying between .36 and .83.

Correlates of Admission of Sexual Interest in Children (CASIC) Substitution

The CASIC items were coded for all 144 cases and a total of 51 (35.4%) individuals obtained a score of 3 or higher. However, the CASIC was used as substitute for CPORT item 5 only in 26 (18.1%) cases: ten cases with missing information on CPORT item 5 and 16 cases where the offender denied any sexual interest in children but obtained a score of 3 or more on the CASIC (Eke et al., 2018b). The remaining 25 cases who scored 3 or more had already admitted having a sexual interest in children. Table 11 replicates the validation study and shows AUCs for the whole sample (fixed 5-year follow-up) for the CASIC as well as for the CPORT total scores with and without missing information (repeated from table 10), and for CPORT total scores where CPORT item 5 was substituted by the CASIC scores of 3 or higher. Like the previous analyses, no significant results were found for the CP+C sub-sample. When missing information on item 5 was substituted by the CASIC score and one additional missing CPORT item was allowed, results support Eke et al.'s (2018a) findings. The AUCs obtained could be considered an intermediate score between the AUCs of CPORT total scores and those of the CPORT without missing information. In addition, when using the CASIC substitution and only one missing CPORT item (generally CPORT item 7), the AUCs were also significant, which was not the case for AUCs when using cases without any missing items.

Table 11

Predictive Accuracy for CPORT: CASIC Substitution in the Fixed 5-Year Follow-Up and Missing Information

	All offenders			CP/NC offenders			CP+C offenders		
	n	AUC	95% CI	*n*	AUC	95% CI	*n*	AUC	95% CI
Item									
Any recidivism									
CASIC total score (all cases)	144	.564	[0.457, 0.671]	123	.557	[0.439, 0.675]	21	.556	[0.201, 0.910]
CASIC total score (no missing data)	21	.611	[0.346, 0.876]	12	.500	[0.139, 0.861]	9	.750	[0.350, 1.000]
CPORT total score (all cases)	144	**.788**	[0.708, 0.868]	123	**.792**	[0.703, 0.881]	21	.556	[0.763, 0.910]
CPORT (no missing data)	21	.728	[0.492, 0.963]	12	.719	[0.408, 1.000]	9	.938	[0.757, 1.000]
CPORT (one missing item+ CASIC)	142	**.780**	[0.701, 0.860]	121	**.783**	[0.695, 0.870]	21	.556	[0.201, 0.910]
Any sexual recidivism									
CASIC total score (all cases)	144	.520	[0.375, 0.666]	123	.435	[0.257, 0.612]	21	.688	[0.459, 0.916]
CASIC total score (no missing data)	21	.563	[0.276, 0.849]	12	.389	[0.011, 0.767]	9	.786	[0.473, 1.000]
CPORT total score (all cases)	144	**.794**	[0.698, 0.890]	123	**.789**	[0.670, 0.909]	21	.688	[0.459, 0.916]
CPORT (no missing data)	21	.631	[0.378, 0.884]	12	.556	[0.220, 0.891]	9	.786	[0.448, 1.000]
CPORT (one missing item+ CASIC)	142	**.755**	[0.647, 0.863]	121	**.734**	[0.598, 0.869]	21	.688	[0.459, 0.916]
Child pornography recidivism									
CASIC total score (all cases)	144	.469	[0.309, 0.630]	123	.385	[0.215, 0.556]	21	.625	[0.368, 0.882]
CASIC total score (no missing data)	21	.500	[0.186, 0.814]	12	.389	[0.011, 0.767]	9	.786	[0.473, 1.000]
CPORT total score (all cases)	144	**.754**	[0.642, 0.866]	123	**.773**	[0.643, 0.904]	21	.625	[0.368, 0.882]
CPORT (no missing data)	21	.596	[0.310, 0.881]	12	.556	[0.220, 0.891]	9	.786	[0.448, 1.000]
CPORT (one missing item+ CASIC)	142	**.711**	[0.586, 0.835]	121	**.716**	[0.569, 0.862]	21	.625	[0.368, 0.882]

Note. CPORT = Child Pornography Offender Risk Tool; CASIC = Correlates of Admission of Sexual Interest in Children; CP = child pornography; AUC = area under the curve; CI = confidence interval. An AUC value is significantly different from chance and is bolded when the 95% confidence interval does not include 0.5.

Recidivism Rates Based on CPORT Scores

Logistic regressions were conducted in order to investigate predicted recidivism rates for CPORT scores. The analyses were performed to examine the predictivity of any recidivism, any sexual recidivism and child pornography recidivism on the whole sample with only one missing CPORT item (most likely item 7) and with the CASIC total score as a substitute for CPORT item 5 for individuals who obtained a score of three or higher on the CASIC. In addition, the analyses were conducted for each offence type subsamples, resulting in nine different analyses in total. Table 12 presents the results from the logistic regressions on the CPORT scores. Odds ratios for the CPORT ranged between 1.38 and 2.42, with a median odds ratio of 1.67. This suggests that, on average, for each one-point increase in CPORT scores the odds of recidivism increases by approximately 63%. Across all nine analyses the Hosmer–Lemeshow test was non-significant (table 12).

Due to the low level of general recidivism in the whole sample (*n*= 35) and even lower in the subsamples (CP/NC = 27, CP+P =8), the results from the analyses must be interpreted with caution and might be considered as unstable. As mentioned by Eke et al (2018a), research recommends that a minimum of 100 recidivists would be essential to consider the logistic regression models as stable (Vergouwe et al., 2005).

Table 12

Logistic regressions results for CPORT scores

Sample	*n*	*n* recidivism	Hosmer-Lemeshow Test			Odds Ratio	95% CI
			x2	*df*	*p*		
Any recidivism							
Whole sample	142	35	5.01	3	.171	**2.23**	[1.58, 3.21]
CP/NC sample	121	27	3.64	3	.303	**2.42**	[1.58, 3.70]
CP+C sample	21	8	3.13	3	.372	2.13	[.835, 5.46]

Any sexual recidivism							
Whole sample	142	14	3.14	3	.370	**1.82**	[1.20, 2.74]
CP/NC sample	121	9	2.67	3	.445	**1.67**	[1.01, 2.77]
CP+C sample	21	5	1.99	3	.573	1.67	[.627, 4.44]
CP recidivism							
Whole sample	142	11	4.02	3	.260	**1.60**	[1.04, 2.48]
CP/NC sample	121	8	1.86	3	.603	1.61	[0.95, 2.72]
CP+C sample	21	3	5.69	3	.128	1.38	[.455, 4.17]

Note. CPORT total scores were restricted to cases with no more than one item with missing information, resulting in a sample of 142 cases. CASIC scores of 3+ were used as a substitute for item 5 in 26 cases. CP/NC = child pornography/noncontact offenders; CP + C = child pornography + contact sexual offenders; CPORT = Child Pornography Offender Risk Tool; CASIC = Correlates of Admission of Sexual Interest in Children. An odd ratio value is significantly different from chance and is bolded when the 95% CI does not include 0.5.

Other indicators of predictive validity

Table 13 presents the four other indicators used to measure the CPORT's predictive validity for sexual recidivism and child pornography recidivism: Sensitivity, Specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV). These variables were calculated using the whole sample but also the sample with only one missing CPORT item and using the CASIC substitution. Although the authors did not specify using a definite cut-off score for the CPORT to determine if someone is considered more at risk of reoffending, based on the ROC analysis, a cut-off score of 2.5 on the CPORT seemed to provide to most accurate prediction for both sexual and child pornography recidivism in terms of Sensitivity and Specificity for the whole sample (all cases with missing information). The results are similar for both samples and both types of recidivism. By using a cut-off score of 3 on the CPORT, it appeared to accurately differentiate between individuals who should be considered to be at high risk of reoffending (Sensitivity) between 31-92% of cases and individuals who should be considered to be at low risk (Specificity) between 64-88% of cases. In terms of its predictive accuracy of risk of reoffending, a CPORT score of 3 or higher appears to have accurately predicted between 10% to 63% of cases (depending on the type of recidivism) where the individual was judged to be at high risk and went on to reoffend (PPV). That cut-

off score's accuracy is even greater in terms of predicting that individuals considered to be at low risk of reoffending did not go on to commit another offence (NPV), accurately predicting between 80% and 98% of those cases.

Table 13

CPORT's Sensitivity, Specificity, Positive and Negative Predictive Values for any sexual and child pornography recidivism

	Any Recidivism			Any sexual Recidivism			Child Pornography Recidivism		
	%	95% CI		%	95% CI		%	95% CI	
Sensitivity	60	[42	76]	71	[42	92]	64	[31	89]
Specificity	81	[73	88]	76	[67	83]	74	[66	81]
PPV	51	[39	63]	24	[17	34]	17	[10	26]
NPV	86	[80	90]	96	[91	98]	96	[92	98]

Note. CPORT total scores with CASIC were restricted to cases with no more than one item with missing information (excluding item 5, where CASIC scores of 3+ were used as a substitute), resulting in a sample of 142 cases. CPORT = Child Pornography Offender Risk Tool; CASIC = Correlates of Admission of Sexual Interest in Children.

Discussion

This study aimed to investigate the Child Pornography Offender Risk Tool's (CPORT) validity in terms of its predictive accuracy of risk of reoffending, within a Scottish sample of offenders convicted of a child pornography offence. This study replicated the most recent CPORT validation study conducted by Eke et al. (2018a) in terms of individuals included in the sample, procedure and analyses. Overall, the sample from this study was similar to the CPORT validation study's sample in terms of demographic variables (e.g. method of detection, contact versus non-contact offenders, child pornography material format), but differed slightly in terms of types of child pornography offence due to differences in legislation, with no offenders having charges of production in this sample. There were also possibly more individuals from rural areas. This sample also largely differed

from the validation sample in terms of CPORT items, with a significant amount of data which was coded as missing information for CPORT item 7, again possibly due to differences in procedure when recording the content of seized material. Interestingly, there was a significant difference between the distribution of the missing information when separating the sample between types of offenders. The CP/NC sample had a significantly larger amount of missing information on the CPORT item 7 compared to the CP+C sample. It is possible that due to their history of sexual contact offending, the investigation into the individuals comprising the CP+C sample included the examination of other material than child pornography.

With a 5-year fixed follow-up sample of 144 men convicted of child pornography offences, this study supports findings from the validation study. A total of 35 (24.3%) of the sample reoffended, with 14 (9.9%) of them being further sexual convictions and 11 of those (7.7%) were new child pornography offences. When looking at the offender type subsamples, 22.3% of the CP/NC subsample had reoffended compared to 38.1% of the CP+C subsample, 7.4% of CP/NC offenders committed a new sexual offence (23.8% for CP+C offenders) and 6.6% committed a new child pornography offence (14.3% for CP+C offenders). The recidivism rates obtained in this study support previous findings from the validation study (Eke et al., 2018a) but also recent results from Elliott et al.'s (2019) study.

In addition, the CPORT significantly predicted any reoffending, including any sexual and child pornography recidivism, with large effect sizes. Similar results were obtained when using a sample with only one piece of missing information (n =142), resulting also in large effect sizes. However, when excluding any missing information, the results were not significant, and this could likely be explained by its considerably smaller sample size (n = 21). This issue was highlighted by Eke et al (2018a) who stressed the likelihood of having unavailable information when using risk assessment tools. In terms of CPORT item 7 (boy versus girl content in other material, excluding child pornography material), it is possible that

in Scottish investigations of child pornography offences this type of information is not currently collected due to differences in definition and legislation around child pornography offences in this country. However, when following the scoring guidelines (Eke et al., 2018b) by omitting only one CPORT item and allowing for the substitution of the Correlates of Admission of Sexual Interest in Children (CASIC) total score of three or higher for missing CPORT item 5 (indication of paedophilic interests), the CPORT total scores also significantly predicted any recidivism, any sexual recidivism as well as child pornography recidivism, all with large effect sizes.

The current study also performed the analysis on subsamples based on history of sexual contact (i.e. current or previous contact sexual charges). The CPORT total scores significantly predicted any recidivism, any sexual and child pornography recidivism with large effect sizes for individuals who had committed a child pornography offence but who did not have any history of sexual contact offences (CP/NC sample), and this was also the case when using cases with only one item of missing information and the CASIC substitution for CPORT item 5. When looking at the subsample of individuals with history of contact sexual offences/charges (CP+C sample), results were not found to be significant. Again, this is likely due to the small size of this subsample (n = 21) and therefore low statistical power.

The predictive validity of the CPORT for recidivism was also calculated for all individuals with only one item of missing information and CASIC substitution, as well as for each subsample, using logistic regressions. Again, similar results were obtained with significant odd ratios for all types of recidivism when looking at the whole sample. In terms of offender type subsamples, only the CP/NC subsample obtained significant results for any recidivism and any sexual recidivism, but not for child pornography recidivism. The CP+C subsample did not obtain significant results. Nevertheless, results from the logistic

regressions suggest that the CPORT total score (with only one missing item and CASIC substitution) significantly predicted any type of reoffending for the whole sample.

Finally, as well as investigating the CPORT's discrimination in terms of predictive accuracy, this study also examined other indicators of the CPORT (i.e. what Singh refers to as calibration) by assessing its levels of Sensitivity, Specificity and Positive and Negative Predictive Values. The analysis was conducted on the cases with only one missing variable and with CASIC substitution for CPORT item 5. Although the CPORT guidelines do not suggest using a specific cut-off score when assessing an individual's level of risk of reoffending with the CPORT, the current ROC analyses indicate that a total score of three appears to provide a high level of Sensitivity and Specificity as well as good Negative Predictive Value and relatively good Positive Predictive Value. This means that a score of three or higher on the CPORT seems to accurately distinguish between individuals who should be considered at high risk of reoffending compared to low risk individuals, as well as identifying individuals who were judged to be at low risk and did not go on to commit another offence. As to individuals who were considered at high risk and ended up reoffending, a score of three of higher on the CPORT appeared to identify between 10% and 51% of them, depending on the type of recidivism. It is important to note that the PPV or NPV are dependent on both the population under study and the technical characteristics of the assessment tool used in the study (Singh, 2013). An assessment tool with relatively high sensitivity and specificity may still obtain a low PPV if the population prevalence is sufficiently low (Goetzinger et al., 2011). The lower the prevalence of an event in the studied population, the lower its his PPV, but the higher is its NPV. This was the case in this study. The low prevalence of sexual and child pornography recidivism in the current sample (*n* = *14*, *n* = 11) explains its low PPV.

Overall, the current findings corroborate the results from the most recent validation study of the CPORT. The results from this study suggest that the CPORT has good predictive validity in a Scottish sample. It also supports previous research suggesting possible differences between child pornography offenders with and without contact sexual offences (Babchishin et al., 2015; Eke et al., 2018a). Further research with larger samples is however needed to provide a more accurate picture of these differences and their implications for risk assessment.

Limitations

Although this study has attempted to replicate the most recent CPORT validation study with what could be considered a reasonable sample size for ROC analysis, when excluding cases with missing information or dividing the sample within offender types, this resulted in much smaller sample sizes which led to lower statistical power. Therefore, some of the results should be interpreted with caution in terms of significance. While the sample size was considered acceptable for ROC analysis to be adequately powered, the total number of recidivists was considerably lower for logistic regressions. The low number of recidivists in the current sample corroborate previous findings indicating that child pornography offenders show low rates of reoffending (e.g. Eke et al., 2011; Endrass et al., 2009; Wakeling et al., 2011). This is a reality that future research on this topic will experience and therefore it might be difficult to obtain a sample with the appropriate number of recidivists for the analysis.

The current study also examined other indicators contributing to the validation of the CPORT with this sample, but these indicators also have their limitations. Sensitivity, Specificity and the Positive and Negative Predictive Values all assume a single cut-off threshold on a risk assessment tool. As the CPORT authors did not mention a cut-off score and strongly recommend the use of other risk assessment tools and professional judgement

when assessing risk of reoffending of child pornography offenders, the results should therefore be interpreted with caution.

Due to data access restrictions, the variables for this study were not collected and solely coded by the lead investigator. Consequently, it was not possible to assess some of the variables such as CPORT items examining the content of the child pornography material. Additionally, the large number of cases which were coded as missing information for CPORT item 7, boy versus girl content in other material (not child pornography material) also suggests the unavailability of some essential information in order to accurately validate and use the CPORT in Scotland. This issue could be resolved by using the compact version of the CPORT (i.e. omitting CPORT items 5 and 7) as the results showed that the CPORT was still significantly predicting risk of any recidivism and any sexual and child pornography recidivism, with large effect sizes. However, the CPORT's authors strongly discourage its use to predict recidivism when more than one item is missing. Another limitation associated with the data collection of this study is possibility that the content items were coded based on a sample of the seized material rather than all material. It is likely that the description of the material seized fit the charges that would likely lead to a conviction but is not necessarily an accurate representation of the totality of material possessed. Again, the restriction in access to the actual seized material makes it impossible to verify its accuracy. Also, to obtain a fixed 5-year follow-up period, some of the data dated as early as 2010. With the advancement in technology and changes in police investigations in the past few years, cases dating earlier than 2014 might not have as much detailed information as more recent ones such as content variables.

Like the validation study, the current work only separated offenders according to their history of contact sexual offences/charges and did not examine differences between child pornography offenders with no criminal history or those with other criminal history such as

fraud or violent offences (non-sexual). As indicated by Eke et al (2018a), including child pornography offenders with non-sexual criminal history with those with no criminal history excludes variability in general criminal history as another potential risk factor for recidivism. In addition, research also suggests that in some cases non-sexually violent charges against convicted sexual offenders were found to actually be sexually motivated when thoroughly analysed (Rice et al., 2006). Future research on this topic might reveal greater differences between those two groups which could be relevant to their risk assessment.

Finally, as the data collection was limited to the east coast of Scotland rather than nationwide, it is not possible to conclude that this sample is an accurate representation of all Scottish child pornography offenders.

Conclusion and Future Research

Despite its limitations, this study supports the current empirical evidence for use of the Child Pornography Offender Risk Tool (CPORT) as a valid assessment tool in the prediction of any recidivism, sexual recidivism and child pornography recidivism in a non-Canadian population. The findings support the use of the CPORT in a Scottish sample of child pornography offenders in relation to identifying potential risk factors and assessing level of risk, therefore aiding case prioritisation. Results also increase empirical support in the use of the Correlates of Admission of Sexual Interest in Children (CASIC) as a substitute to CPORT item 5 (indication of sexual interest in children).

This study obtained similar results by using a sample with one missing CPORT item and by using the compact version (i.e. omitting CPORT items 5 and 7). Although this procedure was already tested (Eke et al., 2018b; Pilon, 2016) and accepted by the CPORT's authors (Eke et al., 2018b), this lack of information, particularly in relation to the content of the seized material, indicates a potential difficulty that criminal justice agencies in Scotland might face when using the CPORT in future. Currently, it appears that some of the

information needed to complete the CPORT, for instance the ratio of boy versus girl in the content of other material, is not routinely recorded by police forces for reasons such as the legality of the material (e.g. images of children in swimming suits) or possibly considered not essential to the investigation. Although these types of images may be considered legal by law, research indicates that individuals with sexual interest in children may use them to relieve sexual arousal (e.g. Taylor et al., 2001). For the CPORT to be used routinely as a risk assessment tool in Scotland, changes to the data collection procedure would have to be made in order to gather crucial information for its completion. This also involves changes in communication and data accessibility for other agencies involved in the criminal justice system in Scotland. As it stands, it seems unlikely that agencies in Scotland other than the Police Force would have access to all relevant information needed, particularly detailed reports of the content of the child pornography material. If the use of the CPORT is made available to other agencies such as Justice Social Workers, it could support them in case prioritisation and management as well as informing intervention.

This study examined the CPORT's predictive validity in a Scottish sample by replicating the original validation study but also by looking at additional factors, which were identified as calibration indicators by Singh (2013). Although results corroborate previous findings and suggest that the CPORT significantly predicts risk of any recidivism, sexual and child pornography recidivism within this population, further research is needed to look at its validity in non-Canadian populations, perhaps with a larger Scottish sample, replicating this study (Babchishin et al., 2018). As risk assessment tools specific to child pornography offenders are greatly needed, this study provides very promising outcomes on the use of this actuarial risk assessment tool to predict risk of reoffending in this population and support relevant authorities in the supervision and management of those cases. Although numerous studies have found actuarial risk assessment tools to be statistically robust and inform

decision making regarding the management of sexual offenders, they do not provide information on the dynamic and protective risk factors which should also be considered when assessing the management and treatment of offenders (Barnett et al., 2010; Garrington et al., 2018). Therefore, it is recommended that the CPORT is used as part of a combination of actuarial and empirically guided clinical judgment assessments, including dynamic and protective factors, to provide a more comprehensive assessment of risk posed by child pornography offenders in Scotland.

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Appendix A

Reasons for Excluded Studies

Reasons for excluded studies

Studies	Reasons for rejection
Alanko et al. (2016)	Focused on genetic factors associated with paedophilic interest, not presenting prevalence of sexual interest in children.
Babchishin et al. (2014)	Looked at sexual interest in children but prevalence not primary or secondary aim and not presented.
Bailey et al. (2016b)	Focused on correlates of contact sexual offenders against children, not prevalence of sexual interest in children
Becker-Blease et al. (2006)	Presents prevalence of sexual interest in children but not a peer-reviewed journal article (poster presentation)
Blanchard et al. (2009a)	Used sample of already diagnosed individuals, not presenting prevalence of sexual interest in children
Bouchard et al. (2017)	Hebephilic and paedophilic items were prohibited by university, so not included in the analysis.
Byers et al. (2012)	Sexual interest in children excluded from data collection
Chi et al. (2012)	Sexual interest in children excluded from data collection
Fedoroff et al. (1999)	Presents prevalence of sexual interest in children but used case series
Gerwinn et al. (2018)	Prevalence of sexual interest in children is not the primary or secondary aim of the study and is not presented
Jordan et al. (2018)	Used sample of men already diagnosed, does not present prevalence of sexual interest in children and this is not the primary or secondary aim of the study.
Joyal (2015)	Looked at paraphilic interest, did not include sexual interest in children in data collection, only “much younger, legal”.
Klein et al. (2015)	Prevalence rates are presented in Dombert et al. (2015).
Mitchell & Galupo (2016)	Focused on prevalence of interest in child molestation (offending), not sexual interest in children.
Noorishad et al. (2019)	Sexual interest in children excluded from data collection
Renaud & Byers (1999)	Did not precise what age in item “having sex with someone much younger than you”.
Schmidt et al. (2013)	Prevalence of sexual interest in children not the primary or secondary aim of the study, presented briefly in discussion, not in results or analysis.
Smallbone & Wortley (2004)	Sexual interest in children excluded from data collection
Stephens et al. (2019)	Does not present prevalence of sexual interest in children as percentage (scale ratings).
Stevens & Wood (2019)	Qualitative study
Taguchi (2015)	Non-English paper (Japanese only) English translation requested from the author if possible, but no reply.
Wurtele et al. (2018)	Used same sample than Wurtele et al. (2014)

Appendix B

Risk of Bias Scale for Prevalence Studies (Hoy et al., 2012)

Appendix 1: Risk of Bias Tool

Name of author(s):_____ Year of publication:_____

Name of paper/study:-

_____

This tool is designed to assess the risk of bias in population-based prevalence studies. Please read the additional notes for each item when initially using the tool. Note: If there is insufficient information in the article to permit a judgement for a particular item, please answer **No (HIGH RISK)** for that particular item.

Risk of bias item	Criteria for answers (please circle one option)	Additional notes and examples
External Validity		
1. Was the study's target population **a close representation** of the national population in relation to relevant variables, e.g. age, sex, occupation?	• **Yes (LOW RISK):** The study's target population was a close representation of the national population. • **No (HIGH RISK)**: The study's target population was clearly NOT representative of the national population.	The **target population** refers to the group of people or entities to which the results of the study will be generalised. Examples: • The study was a national health survey of people 15 years and over and the sample was drawn from a list that included all individuals in the population aged 15 years and over. The answer is: **Yes (LOW RISK).** • The study was conducted in one province only, and it is not clear if this was representative of the national population. The answer is: **No (HIGH RISK).** • The study was undertaken in one village only and it is clear this was not representative of the national population. The answer is: **No (HIGH RISK).**
2. Was the sampling frame a **true or close representation** of the target population?	• **Yes (LOW RISK):** The sampling frame was a **true or close** representation of the target population. • **No (HIGH RISK)**: The sampling frame was NOT a **true or close** representation of the target population.	The **sampling frame** is a list of the sampling units in the target population and the study sample is drawn from this list. Examples: • The sampling frame was a list of almost every individual within the target population. The answer is: **Yes (LOW RISK)**. • The cluster sampling method was used and the sample of clusters/villages was drawn from a list of all villages in the target population. The answer is: **Yes (LOW RISK)**. • The sampling frame was a list of just one particular ethnic group within the overall target population, which comprised many groups. The answer is: **No (HIGH RISK).**
3. Was some form of **random selection** used to select the sample, OR, was a census undertaken?	• **Yes (LOW RISK):** A census was undertaken, OR, some form of random selection was used to select the sample (e.g. simple random sampling, stratified random sampling, cluster sampling, systematic sampling). • **No (HIGH RISK)**: A census was NOT undertaken, AND some form of random selection was NOT used to select the sample.	A census collects information from every unit in the sampling frame. In a survey, only part of the sampling frame is sampled. In these instances, random selection of the sample helps minimise study bias. Examples: • The sample was selected using simple random sampling. The answer is: **Yes (LOW RISK)**. • The target population was the village and every person in the village was sampled. The answer is: **Yes (LOW RISK)**. • The nearest villages to the capital city were selected in order to save on the cost of fuel. The answer is: **No (HIGH RISK).**
4. Was the likelihood of **non-response bias minimal?**	• **Yes (LOW RISK):** The response rate for the study was >/=75%, OR, an analysis was performed that showed no significant difference in relevant demographic characteristics between responders and non-responders • **No (HIGH RISK)**: The response rate was <75%, and if any analysis comparing responders and non-responders was done, it showed a significant difference in relevant demographic characteristics between responders and non-responders.	Examples: • The response rate was 68%; however, the researchers did an analysis and found no significant difference between responders and non-responders in terms of age, sex, occupation and socio-economic status. The answer is: **Yes (LOW RISK)**. • The response rate was 65% and the researchers did NOT carry out an analysis to compare relevant demographic characteristics between responders and non-responders. The answer is: **No (HIGH RISK)**. • The response rate was 69% and the researchers did an analysis and found a significant difference in age, sex and socio-economic status between responders and non-responders. The answer is: **No (HIGH RISK)**.

Internal Validity		
5. Were data collected **directly from the subjects** (as opposed to a proxy)?	• **Yes (LOW RISK):** All data were collected directly from the subjects. • **No (HIGH RISK)**: In some instances, data were collected from a proxy.	A proxy is a representative of the subject. Examples: • All eligible subjects in the household were interviewed separately. The answer is: **Yes (LOW RISK)**. • A representative of the household was interviewed and questioned about the presence of low back pain in each household member. The answer is: **No (HIGH RISK)**.
6. Was an acceptable case definition used in the study?	• **Yes (LOW RISK):** An acceptable case definition was used. • **No (HIGH RISK)**: An acceptable case definition was NOT used.	• For a study on low back pain, the following case definition was used: "Low back pain is defined as activity-limiting pain lasting more than one day in the area on the posterior aspect of the body from the bottom of the 12th rib to the lower gluteal folds." The answer is: **Yes (LOW RISK)**. • For a study on back pain, there was no description of the specific anatomical location 'back' referred to. The answer is: **No (HIGH RISK)**. • For a study on osteoarthritis, the following case definition was used: "Symptomatic osteoarthritis of the hip or knee, radiologically confirmed as Kellgren-Lawrence grade 2-4". The answer is: LOW RISK.
7. Was the study instrument that measured the parameter of interest (e.g. prevalence of low back pain) shown to have **reliability and validity (if necessary)**?	• **Yes (LOW RISK):** The study instrument had been shown to have reliability and validity (if this was necessary), e.g. test-re-test, piloting, validation in a previous study, etc. • **No (HIGH RISK)**: The study instrument had NOT been shown to have reliability or validity (if this was necessary).	• The authors used the COPCORD questionnaire, which had previously been validated. They also tested the inter-rater reliability of the questionnaire. The answer is: **Yes (LOW RISK)**. • The authors developed their own questionnaire and did not test this for validity or reliability. The answer is: **No (HIGH RISK)**.
8. Was the **same mode of data collection** used for all subjects?	• **Yes (LOW RISK):** The same mode of data collection was used for all subjects. • **No (HIGH RISK)**: The same mode of data collection was NOT used for all subjects.	The mode of data collection is the method used for collecting information from the subjects. The most common modes are face-to-face interviews, telephone interviews and self-administered questionnaires. Examples: • All eligible subjects had a face-to-face interview. The answer is: **Yes (LOW RISK)**. • Some subjects were interviewed over the telephone and some filled in postal questionnaires. The answer is: **No (HIGH RISK)**.
9. Was the **length of the shortest prevalence period** for the parameter of interest appropriate?	• **Yes (LOW RISK):** The shortest prevalence period for the parameter of interest was appropriate (e.g. point prevalence, one-week prevalence, one-year prevalence). • **No (HIGH RISK)**: The shortest prevalence period for the parameter of interest was not appropriate (e.g. lifetime prevalence)	The prevalence period is the period that the subject is asked about e.g. "Have you experienced low back pain over the previous year?" In this example, the prevalence period is one year. The longer the prevalence period, the greater the likelihood of the subject forgetting if they experienced the symptom of interest (e.g. low back pain). Examples: • Subjects were asked about pain over the past week. The answer is: **Yes (LOW RISK)**. • Subjects were only asked about pain over the past three years. The answer is: **No (HIGH RISK)**.
10. Were the **numerator(s) and denominator(s)** for the parameter of interest appropriate?	• **Yes (LOW RISK):** The paper presented appropriate numerator(s) AND denominator(s) for the parameter of interest (e.g. the prevalence of low back pain). • **No (HIGH RISK)**: The paper did present numerator(s) AND denominator(s) for the parameter of interest but one or more of these were inappropriate.	There may be errors in the calculation and/or reporting of the numerator and/or denominator. Examples: • There were no errors in the reporting of the numerator(s) AND denominator(s) for the prevalence of low back pain. The answer is: **Yes (LOW RISK)**. • In reporting the overall prevalence of low back pain (in both men and women), the authors accidentally used the population of women as the denominator rather than the combined population. The answer is: **No (HIGH RISK).**
11. Summary item on the overall risk of study bias		
• **LOW RISK OF BIAS:** Further research is very unlikely to change our confidence in the estimate. • **MODERATE RISK OF BIAS:** Further research is likely to have an important impact on our confidence in the estimate and may change the estimate.		

Appendix C

University of Edinburgh Ethical Approval

SCHOOL of HEALTH IN SOCIAL SCIENCE
CLINICAL AND HEALTH PSYCHOLOGY

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Valerie Savoie
Trainee Clinical Psychologist
School of Health in Social Science
University of Edinburgh

08 February 2019

Dear Valerie,

Application for Level 1 Ethical Approval

Reference: CLIN552
Project Title: Predicting the Risk of Reoffending in Internet Sexual Offenders: The use of Child Pornography Offender Risk Tool in a Scottish population
Academic Supervisor: Ethel Quayle

Thank you for submitting the above research project for review by the Department of Clinical and Health Psychology Ethics Research Panel. I can confirm that the submission has been independently reviewed and was approved on the 13th December 2018.

Should there be any change to the research protocol it is important that you alert us to this as this may necessitate further review.

Yours sincerely,

Kirsty Gardner
Administrative Secretary, Clinical Psychology

Appendix D

Protocol for the Empirical Research Study (from ethic proposal)

The Child Pornography Offender Risk Tool (CPORT) is a structured risk checklist especially developed to predict any sexual recidivism among adult male offenders with a conviction for Online Child Sexual Abuse offences. CPORT was developed from an existing dataset comprising of variables from 286 OCSA offenders after a 5-year follow-up period. Based on previous studies, they looked at specific information e.g. previous criminal history, age at Index Offence and gender of the child in the OCSA material. As it was developed in Canada and so far has only been validated there on a single data set (Seto & Eke, 2017), it is not possible to suggest that the CPORT would be an accurate tool to use to predict risk of recidivism within non-Canadian populations. The aim of the proposed study is to investigate its predictive validity in a Scottish sample of OCSA offenders.

Design

Similarly to the CPORT study, a non-experimental, retrospective case series design will be employed. By using retrospective data, it will be possible to explore reoffending outcomes over a five to seven years period. A prospective design would not have been possible within the time available for the current research. The main researcher and supervisors are in discussion with Police Scotland and the Scottish Risk Management Authority currently about collaborating with them for data collection. This would imply Police Scotland will provide the required anonymised information from their internet offenders data to complete the CPORT. To replicate the validation study of the CPORT, the proposed study will need to obtain the following information related to the seven factors that could predict the risk of reoffending in OCSA offenders: 1) age at time of Index Offence; 2) details of criminal history; 3) history of contact sexual offence; 4) any failure on conditional release; 5) indication of paedophilic/hebephilic interests; 6) ratio of boy to girl content in OCSA material and 7) ratio of boy to girl content in other material. If collaboration with Police Scotland is possible, it is likely that the data will still require cleansing in the form of substantial reorganisation, manipulation, and statistical analysis in order that the research questions could be answered. In addition, similarly to the CPORT validation study, if it is not possible to answer item 5 from Police Scotland data, the researcher intends to use the Correlates of Admission of Sexual Interest in Children (CASIC) suggested by the CPORT's authors which would involve collecting the following information: 1) marital status,; 2) if the internet offence included videos; 3) if the internet offence content included sexual stories involving children; 4) evidence of interest in child pornography spanning 2 or more years; 5) whether they have volunteered in a role with access to children; and 6) engaged in online sexual communication with a minor or officer posing as a minor. Details of any re-offending within the five year follow up period would be required.

Although already collected, data will require substantial reorganisation, manipulation, and statistical analysis in order that the research questions could be answered. There is also a possibility to collaborate with CISSO, a criminal justice social work (CJSW) project funded by the Scottish Government working with sex offenders (including internet offenders), which has also already collected data on an internet offenders sample. This sample could add or complete the existing data from Police Scotland.

Participants

As the primary aim of this research is to investigate the predictive validity of the CPORT in a Scottish population, the following inclusion and exclusion criteria would be applied. These are based on Seto and Eke's (2015) study.

Inclusion criteria

Aged 18 or older; Male; Have a conviction of OCSA offence as their IO and/or a history of contact offences against children and an OCSA offence (dual offenders)

Exclusion criteria

Females; Under 18; IO is not an OCSA offence; Insufficient data related to the research questions

To obtain an adequate statistical power it is hoped to gain a sample size of around 100 internet offenders. This was calculated using three different statistical power calculators, namely G*Power, Soper and MedCal which together suggested a minimum sample size between 90 and 103 participants in order to obtain a medium effect size for the proposed study.

Procedure

As well as the CPORT and CASIC items, it is hoped to obtain information on offence related variables, particularly on reoffending outcomes. The data will be reorganised, recoded, anonymised (if not already) and manipulated by the researcher in order to use the CPORT and answer the main research question. Anonymised data will be securely stored on an encrypted NHS Lothian computer.

It is intended to conduct the following analyses:

- **Description of baseline and follow-up data**
  Descriptive statistics such as numbers and proportions (percentages) for categorical variables and means, medians and ranges for continuous variables will be used to present the sample's background information (e.g. age at time of index offence, criminal history).
- **Predictive validity of the CPORT and its items**
  Multiple regressions will be conducted to look at the predictive validity of each CPORT item. To analyse the relationship between CPORT score and recidivism outcomes the area under the curve (AUC) of the receiver operating characteristic (ROC) will be used, replicating Seto and Eke's (2015) own analysis when looking at the CPORT's predictive validity. The use of ROC analysis has increased in clinical psychology, particularly when looking at the predictivity of risk assessment tools (e.g., Barnett et al., 2010; Darjee et al., 2016; Grubin, 2011; Long et al., 2016; Thornton et al., 2003). In addition, when investigating a tool's predictive accuracy, it has been highly recommended to use AUC from a ROC analysis as the effect size rather than the Cohen's *d* or Pearson's *r* (Rice & Harris, 2005). Therefore, each item of the CPORT will be scored from 0 to 7 and ROC analysis will be performed to investigate their predictive validity in regard to reoffending. Similar analyses will be conducted to investigate the use the CASIC items to replace missing information on item 5 from the CPORT.
- **Differences between groups**
  To explore any potential difference between groups of offenders (i.e. Internet only, Contact, Solicitor/Groomer) on certain variable (e.g. rate of reoffending, age at index offence, criminal history), one-way analysis of variance (ANOVA) will be used.

The study will form part fulfilment of the Doctorate Clinical Psychology qualification and dissemination of the study findings would be undertaken once the project has been completed. It is the researcher's intention to submit the study for publication. The main researcher has contacted Charlotte Smith, Research Governance Coordinator at the University of Edinburgh, who confirmed that this research does not require University Sponsorship. Mr Kenneth Scott, NRS Generic Review Manager, has also confirmed that this research does not require R&D review. Regarding the collaboration with Police Scotland and possibly Criminal Justice Social Work in relation to accessing their data, it was agreed with them that they would provide permission to access data following ethics approval from the University of Edinburgh and the completion of a Privacy Impact Assessment for the Criminal Justice Social Work data. In addition, the main researcher has also contacted Rena Gertz, Data Protection Officer, who confirmed that a Privacy Impact Assessment is also required for the university which has been completed and will be send following ethics approval.

Appendix E

Journal of Child Abuse and Neglect: guide for authors

GUIDE FOR AUTHORS

Types of contributions

1. **Research Article**: Child Abuse and Neglect publishes quantitative, qualitative, and mixed-method research. Particular focus will be placed on thorough and appropriate methods, strong data analysis and discussion of implications for the field.

2. **Reviews**:Authors with plans for proposed review articles (systematic, meta-analytic, scoping) are invited to first submit a draft outline to the Editor-in-Chief for review. Please send proposals to chiabu@elsevier.com. The editors may also commission reviews on specific topics. Reviews submitted without invitation or prior approval may be returned.

3. **Medical Report**:Child Abuse and Neglect publishes clinically-relevant original research using a more structured medical format. Medical Reports should include a structured abstract of no more than 250 words including the following sections: Background, Objective, Participants and Setting, Methods, Results (giving specific effect sizes and their statistical significance), and Conclusions. Manuscript length is limited to 3,000 words (excluding the abstract, tables and figures, and references or appendices) and up to 5 figures or tables (additional figures or tables may be considered as online appendices). Medical reports should include the following sections: Introduction: In 1-2 pages, state the objective of the study and provide adequate background that a reader can determine whether they should read the paper in its entirety. Methods: Provide sufficient detail that the study could be repeated by another investigator. Results: Provide main and secondary results. Discussion: Summarize the most important results and provide the authors interpretation of relevance in the context of any relevant prior literature. The discussion section should include a section on the articles strengths and limitations, and suggested next steps. Conclusion: In 1-2 sentences, summarize the authors final conclusions. Medical Reports should include 2 sections highlighting the importance of the paper; What is known and What this study adds. Each section is limited to 40 words.

4. **Discussion Article**: Plans for proposed critical review discussion articles are invited to first submit a draft outline to the Editor-in-Chief. Please send proposals to chiabu@elsevier.com. These articles may discuss a policy or legal / philosophical framework or a brief data report. The article must present a critical analysis of areas of gap in practice or research, current critical or emergent issues, with an expectation of utilizing an integration and discussion of empirical research.

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